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Industrial Uses of the Spectroscope

A FEW weeks ago we commented on Professor Paneth's lecture upon the use of radio-activity in analytical and research work. Professor Fowler, in his presidential address to the Second Industrial Physics Conference, has introduced a subject only a degree less novel to many industrial chemists—namely, the use of spectroscopy in industry. Spectroscopic methods are now finding applications in many industrial establishments. These are not only for the purpose of analysis, for Professor Fowler records that the first industrial use of the spectroscope was to control the air-blast to the Bessemer convertor in 1863.

Qualitative spectrum analysis has been the standard method employed in astro-physics, and in some branches of terrestrial chemistry for many years. All the metallic elements can be detected in this way by simple methods and so also can many non-metallic elements. The industrial use of spectroscopy has resulted in a striking simplification of the procedure due to improved design of instruments. The troublesome use of a comparison spectrum has been avoided, and increasing use is being made of photographic methods which enable the photograph to be taken by an intelligent laboratory assistant, to be subsequently examined at leisure by an experienced physicist. Nor need the novice be deterred by the fact that the complete spectra of some elements contain hundreds of lines. When the quantity of an element in a mixture is small only certain of the most persistent lines are observed, so that once these lines have been catalogued —an operation performed many years ago once and for all by de Gramont—it is only necessary to look for these few *raies ultimes* to ascertain the presence or absence of an element. The greater the excitation of an element, the more electrons are expelled, and the spectrum may change in character. For this reason the ultimate lines that persist longest are not necessarily the same in the arc and spark spectra, nor is the energy necessary to produce enhanced lines in the range covered by the ordinary quartz spectrograph the same for different elements. In the most obvious use of the spectroscope, the identification of elements in materials submitted for analysis, some knowledge of the subject is required if mistakes are not to be made.

Perhaps the most interesting development of industrial spectroscopy is in the domain of quantitative analysis. It hardly seems possible at first sight for the spectroscope to be made closely quantitative, but much attention has been paid to this branch of the subject within recent years. The idea underlying most of the methods, according to Professor Fowler, is that as the percentage of an element in the material under examination is reduced, there will be an accompanying decrease in the intensities of the spectrum lines, so that a correlation between the percentages and the intensities may be found by experiment. No general theoretical principle has been discovered, however, and each problem must be worked out individually. Nevertheless, once that has been done, the spectroscope has valuable applications for rapid routine work. One such method is to pass a condensed spark between an electrode of the alloy under test and another consisting of the principal metal, the amount of which is not to be estimated. The lines of the main constituent can be extended over the whole space between the electrodes, whilst those of the minor one only appear near the corresponding element, and extend to different lengths according to the quantity present. There are many difficulties, such as lack of homogeneity of the specimen, formation of oxides on the electrodes, indefiniteness of the spectrum lines, and so forth, and it can well be appreciated that in most instances the spectroscope is not an instrument for precise analytical measurement, so much as a quick method of approximation.

Some of the examples of industrial use given by Professor Fowler will serve to explain the value of the spectroscope industrially. Lead sheathing for cables must contain between 0.8 and 1.0 per cent. of antimony, and it is only necessary to prepare two standards, one with each of the limiting percentages, to spark them under identical conditions, and to ascertain if the antimony lines are of intermediate intensity. Similarly, the routine analysis of brass and lead alloys has been made regularly for control purposes. An interesting side-light on the value of the spectroscope for sorting purposes is that in one very large works where this method has been brought into use complaints of wrong materials being sent out have disappeared. The spectrographic method is employed in many fields of industrial research, amongst which Professor Fowler mentioned that of agricultural chemistry. Here the percentage of major elements are estimated in the usual way by reference to standard samples, and identification of traces of other elements has been found to be more rapid and certain than by any chemical method. The spectrograph is, of course, used for determining the sensitivity of photographic plates over the range of the spectrum, and for many other purposes. It is an instrument which is coming largely into use for many industrial purposes and, as Professor Fowler has shown, it could, with advantage, be used in many other ways once its limitations and advantages are clearly realised in advance. This address is yet another example of the value of the physicist in industry, and a justification, if one were needed, of the work of the Institute of Physics.

Notes and Comments

The New Premier and the Old

THE business community has every reason to support the national vote of thanks which has been awarded to Mr. Baldwin in the last few days. Coming of English industrial stock, he understood, better than any of his predecessors as Prime Minister, the complex world of trade and industry. He took great electoral risks for what he believed to be a sound national fiscal policy, and his final term as Prime Minister was notable for a revival of confidence, accompanied by expanding trade and declining unemployment. His successor bears a great name, and his record at the Treasury compares favourably with that of any of the great Chancellors of the Exchequer of the past. For six years Mr. Chamberlain has stood like a rock for sound finance, and nobody has ventured to challenge his claim to the succession to the highest office in the State. He, too, is a Midlander, a man of Birmingham, whom the business community trusts for his energy, experience, and realistic outlook. At the same time, Mr. Runciman cannot be allowed to leave the Board of Trade without an expression of gratitude for a laborious task successfully discharged. The Board of Trade has never had a more reasonable and accessible head, and Mr. Oliver Stanley will find him an extremely difficult man to follow. Another change in which the chemical industry is directly interested is the appointment of Dr. E. Leslie Burgin as Minister of Transport in succession to Mr. Hore-Belisha. As Parliamentary Secretary to the Board of Trade, Dr. Burgin had many friends in the industry who, while wishing him well in his new office, will extend a welcome to his successor, Captain Euan Wallace, formerly secretary of the Department of Overseas Trade.

Simpler Tax with Larger Yield

IN no direction will the withdrawal of the National Defence Contribution tax proposals meet with greater satisfaction than in the chemical industry, several of the leaders of which signed a letter to "The Times" on Monday advocating a committee of inquiry on the proposals which at that time still formed part of the Finance Bill. There is little to be said about the announcement in the House on Tuesday except to welcome the Prime Minister's action wholeheartedly and to add a tribute of respect to his courage. On the morrow of the Budget THE CHEMICAL AGE said that the tax was hopelessly wrong in almost every particular. The proposals, even in the form in which they were amended last week, would have imposed particular hardships upon the chemical manufacturing trade owing to its varying fortunes over the period which was to have formed the basis for calculating profits. Industry will, however, have to find at least the £25,000,000 originally expected from the tax. The form of the new tax is not yet known, but it is to be a simpler tax with a larger yield, possibly modelled to some extent on the lines of the old Corporation Profits Tax introduced in 1920 and repealed in 1924. At all events the Government will now get the money it needs for the re-armament programme by a straightforward levy on all profits, and this time will find the entire business community ready to co-operate.

Chemical Industry Flourishing

INCREASED activity in nearly every branch of the chemical industry is reflected in the 73rd Annual Report on Alkali, etc., Works just presented by Mr. W. A. Damon, the chief inspector, who expresses the view that all the circumstances point to more settled conditions and even greater production of chemicals in the future. A tendency to work plants to their full capacity is noted, and the fact that the average of all tests on chimneys and other final outlets to the atmosphere is of the same order as last year is satisfactory from the point of view of a department dealing primarily with the checking of fume emissions. Simultaneously with the increased work occasioned by the flourishing state of the chemical industry the alkali inspectors have been called upon to advise on developments in connection with smoke abatement. A preliminary investigation of that subject indicates that although the cities are active in smoke abatement work they receive in general but little support from the outlying areas, and much of the good work performed in the cities is lost by reason of pollution having its source outside. Smoke abatement cannot adequately be dealt with parochially, and Mr. Damon suggests that the greatest prospect of success would be ensured if the problem were attacked by regional committees.

A Commercial Library

THE Southwark Public Libraries Committee is rendering a useful service to the business community of the borough by distributing 2,000 copies of a brochure presenting in concise form particulars of the facilities available at the new commercial library in Southwark Bridge Road which is to be opened this month by the Mayor, Councillor C. J. Mills. A valuable feature of the brochure is a classified list of the contents of THE CHEMICAL AGE and 248 other trade and technical periodicals, which will enable the reader to find at a glance the journal dealing with any particular trade or commodity on which he requires current information. There is also an alphabetical list of trade and technical papers and lists of general and local directories, atlases and maps, covering not only Great Britain, Ireland and the British Empire, but also many foreign countries. All the material of the library is exactly classified. Every subject has its own number, and this number will find it whatever its form. The catalogue, on cards, is arranged on the dictionary principle under author, subject and title and, in addition, in the case of Government publications, under the name of the department.

Chemistry Gone Wrong

A UNIVERSITY professor of chemistry in the United States is reported recently to have offered to eat his shirt if an assertion he made was wrong, and to have done so when he was proved in error. To perform this troublesome feat he first dissolved the shirt in acid, then neutralised the acid with another chemical, and proceeded to filter out all poisonous ingredients with a specially designed apparatus. Finally his last operation was to spread the resultant pulp on a piece of bread and make a meal of it.—"Concord" (Liverpool Borax Co., Ltd.).

Fume Emission at Alkali, etc., Works

73rd Annual Report of the Chief Inspector

ACCORDING to the 73rd Annual Report on Alkali, etc., Works (Stationery Office, 1s.) the number of works registered in 1936 was 978, involving the operation of 1,850 separate processes. The tendency for the number of sulphate of ammonia by-product plants to decrease continues, but is less marked than it has been hitherto. Smelting, sulphuric acid, chemical manure and tar plants are also decreased in number. On the other hand, plants for the concentration of ammoniacal liquors are increasing and there is again a substantial rise in the number of benzene plants. The totals show a net increase since last year of one works and four processes.

The general expansion of trade has been reflected by increased activity in nearly all the chemical industries. The iron and steel trades are making great demands on the coke ovens for metallurgical coke. The non-ferrous metals are also holding their own although they have been supplanted in some directions by the new plastics and moulding powders. Expansion in the paper and artificial silk business has resulted in an increased consumption of carbon bisulphide, chlorine, bleaching powder, and sulphuric acid. Galvanised sheets and appliances have required, for their manufacture, large quantities of hydrochloric acid and ammonium chloride. Acids and rubber chemicals have been in demand for the cycle and motor trades, whilst an increased use of soda ash for glass manufacture, laundry work and water softening, and of sodium cyanide for case-hardening is to be recorded. Among the organic solvents an increase in the use of carbon tetrachloride and trichlorethylene for metal degreasing and for the cleansing of clothes and fabrics is apparent. The tar distilling industry has been maintained at a high level, an exceptionally heavy demand for creosote and naphthalene having offset a severe slump in pitch. All the circumstances seem to point to more settled conditions and even greater production of chemicals in the future.

The flourishing state of chemical industry has thrown additional work on the inspecting staff and, as in previous years, their duties have by no means been confined to registered works. Many inquiries and complaints have been received relating to unregistered processes and visits in connection with them generally occupy more time than routine inspections of registered works.

Dust from Blast Furnaces

Several complaints have been made calling attention to nuisance caused by deposition of dust, which is emitted from the bleeder pipes of blast furnaces. Blast furnace gas has some calorific value and is customarily utilised for raising steam, running gas engines and for other purposes. The gas thus used must first be dedusted and no objection can then be raised to its use. The trouble is due to a practice of dedusting only that portion of the gas which is to be used and blowing the unwanted surplus to atmosphere, via the bleeder pipes, in an uncleaned condition. Wasteful though it is, it is admittedly sometimes necessary to blow off surplus gas but the position of the blow off should be *after* the dedusting plant. That is to say, the whole of the gas, whether it is to be used or wasted, should be cleaned.

Nicotine Extraction Works

A local authority enlisted the services of the Chief Inspector to secure abatement of fumes arising from the burning of tobacco residues, which are employed as fuel for steam-raising purposes. On account of the necessity for frequent refuelling and because the draught has to be restricted in order to avoid blowing out the very light ash produced, it was difficult to secure complete combustion. At first, it was thought that the residues might advantageously be bricquetted with a combustible binding, which would make a fuel more easy to handle and burn efficiently. This scheme was not favoured, however, for the good reason that the residues alone provide more than sufficient fuel for steam requirements. The height of the chimney has now been raised and the dust depositing chamber has been enlarged so as to allow of a slightly greater draught being used.

Choking fumes were traced to a furnace where copper scalings, pickling residue and grease are burned to obtain a material suitable for treatment to recover copper. The acid nature of the material and inefficient combustion were the major causes of the objectionable fume. Steps have been taken to improve control over the burning operation, but it may yet be necessary to resort to scrubbing of the fumes in order to reduce their acid content.

Alkali and Copper Wet Process Works

The tonnage of salt decomposed in 1936 was 59,690 tons in the salt-cake process and 3,280 in the wet copper process. Compared with those of last year, these figures show an increase of 2,430 tons in the salt-cake process and a decrease of 1,920 tons in the wet copper process. The average of escapes of hydrochloric acid gas from these works to atmosphere was 0.079 grain per cu. ft. which may be compared with last year's figure of 0.075 grain. The overall efficiency of all salt-cake processes (on a basis of 90 per cent. NaCl in the salt used) has worked out at 95.8 per cent., individual results varying from 88.9 per cent. to 104.9 per cent. The average is not quite up to last year's figure, which was 96.7 per cent., but the margin of variation is appreciably less.

There have been two occasions when the test made by the Inspectors have shown escapes to be in excess of the statutory maximum; these were 0.53 grain and 0.23 grain per cu. ft. In the first case, the high escape was due to a temporary shortage of water supply to the absorber. The fault was immediately corrected and after one hour the escape was reduced to 0.15 grain. In the second case, trouble was and is still being experienced by reason of entrainment of acid spray due to the high speed of the gases through the absorption system. A complaint of excessive acid fume emission was made against another works at which the process has been well conducted and where progressive improvement in efficiency has been shown. No fault could be traced, yet it may be that there had been some temporary outbreak during the night. The plant is now being improved further by the installation of a fan and silica condensers.

The only wet copper process operating in this country was faced, at the beginning of 1936, with the necessity of undertaking extensive repairs. Several months were occupied with this work, the larger scrubbers being extended and repacked and the chimney being rebuilt. The results were disappointing for the anticipated improvement in efficiency was not obtained. Further alterations have since been made and recent tests have shown a decrease in the escape of acid gas.

Cement Production Works

The demand for and production of cement has been high throughout the year. It is not surprising that there should have been a number of complaints on the score of dust emission for high dust escape is a natural concomitant of high throughput. Electrical precipitation is now practised at a number of works and plant is being installed or is on order at many others. The dust emission can readily be reduced thereby to a concentration below 0.5 grain per cu. ft. New works to which Sections 7 and 9 (5) of the Act of 1906 now apply by virtue of the Alkali Order, 1935, are therefore expected to install means whereby the escape will be reduced (without dilution by air) to that order of concentration.

At one small works against which complaint of offensive smell has been made, a Traughber filter is to be installed. In this plant the dust laden gases are forced through a series of layers of foam which, it is claimed, effect satisfactory dedustiny and at the same time will remove sulphur dioxide and hydrogen sulphide. The installation will be the first of its kind in this country for the purpose of treating cement kiln gases and its performance will be observed with interest.

Smelting Works

The average acidity of escapes (2.35 grains) remains of the same order as in previous years. A new process for the recovery of sulphur dioxide from roaster gases, known as the "sulphidine process," has been patented (Brit. Pat. 435,116 and 443,314). The gases are scrubbed by xylidine or toluidine and water and the absorbed sulphur dioxide is recovered by heating the solution. Precipitation of organic sulphate is prevented by the addition of alkali or alkaline earth compounds to the wash liquor. Details of the process were given in "Chem. Trade J.," 1935, *99*, 530. According to another patent (Brit. Pat. 439,467), flue gases are reduced with carbon and cleaned by means of electrical precipitation before contact with a catalyst. Sulphur is said to be recoverable in a pure state. The I.C.I. process, mentioned in the 72nd report (p. 16), has been improved by the development of a better solvent for sulphur dioxide, viz., basic aluminium sulphate (Brit. Pat. 445,711).

Production of spelter at the Avonmouth and Llansamlet works has been maintained at a high level, but the zinc works at Seaton Carew has been closed and that at Bloxwich is also likely to close during the current year. The acid gases evolved from the roasting of zinc blend are converted to sulphuric acid. There has been no lessening of zinc oxide fume during the reduction of the oxide to metal in the old horizontal retorts, but the new vertical plant is undoubtedly a great improvement in this respect. The development of this modern plant at Avonmouth indicates the steady progress that has been made on the research side and organisation of the industry.

There has been an increase of one in the number of works in Cornwall at which tin sulphide ores are calcined. Although occasions have arisen when the acidities of the exit gases have increased by reason of altered working or changes in the type of concentrate, yet matters have always been readily remedied by improved packing of the scrubbers or increased supply of lime water.

The new calciner house of the Mond Nickel Co., at Clydach, has been completed and is one of the finest of its type. The use of mixed sintered and Bessemer mattes has been continued and this policy has resulted in a progressive reduction in the amount of sulphur oxides emitted to atmosphere. Electrical precipitators have been installed to remove dust from the calciner gases before their discharge and efficiencies of the order of 99 per cent. are being obtained. Underground flues, which have been liable to inleakage of water, are being replaced by overhead flues.

Sulphuric Acid Works

The production of sulphuric acid in England and Wales during 1936 was 867,000 tons, calculated as mono-hydrate. This is an increase of 83,000 tons compared with the production in 1935. By the courtesy of the National Sulphuric Acid Association, Ltd., the following details are available:—

	1936 *Per cent.*	1935 *Per cent.*
Proportion of available plant in use ...	81	75
Proportion of total made in:—		
(*a*) Chamber Plant	66.5	70.1
(*b*) Contact Plant	33.5	29.9

Raw materials used as a source of sulphur supply were as follows:—

	Tons
Pyrites and anhydrite	287,300
Sulphur and H_2S	59,800
Spent Oxide	147,400
Zinc Ores...	160,900

The number of sulphuric acid works is less by four than at the end of 1935. The plants in operation have been worked more intensively and, on the whole, maintenance and supervision have been good. A number of major repairs and replacements have been effected and, in this connection, it should be emphasised that the cumulative effect of minor leaks from chambers, etc., may well cause local disturbance even though the actual exit acidity be kept well below the permitted limit.

At one particular works a plant has been erected in which the source of sulphur is the saturator gas from the sulphate of ammonia plant, except at such times as the latter may be idle, in which case a brimstone burner is brought into use. The plant consists of two Glover towers, one Gaillard-Parrish tower chamber, in which chamber acid is atomised, one half packed tower, in which chamber acid is circulated, and three Gay Lussacs followed by a water wash tower. The plant produces the equivalent of 80 tons of 70 per cent. acid per week at an efficiency of 95 per cent. It is expected eventually to make greater use of the sensible heat of the burner gas, so as to concentrate the make to 95 per cent. The total acidity of the escape can be maintained at about one grain.

The average escape from sulphuric acid plants was the same as that for the previous year—1.62 grains per cu. ft. Cases of excessive escape, *i.e.*, exceeding the maximum of four grains (as SO_3 per cu. ft.) which is permitted by the Act were due to breakdowns of pumps, fans, nitre supply, etc. Whilst recognising that such breakdowns inevitably occur from time to time, it should be pointed out that suitable provision of stand-by plant and spares would, on several occasions, have prevented complete disorganisation of the process. The collection of the condensate from an ammonia oxidation plant forms a useful reserve of nitre for emergencies. Other cases were due simply to lack of supervision, for which there can be no excuse. Sulphuric acid plants should be under skilled and systematic control and when plants are working at high pressure this need is specially evident.

The Study of Atmospheric Pollution

Half-Yearly Conference

REPRESENTATIVES of local authorities and other organisations co-operating with the Department of Scientific and Industrial Research in regard to atmospheric pollution met for their half-yearly conference in London on Monday. In the absence, owing to indisposition, of the chairman (Mr. W. Brownhill Smith), Dr. H. A. Des Voeux, a past chairman, presided.

Dr. G. M. B. DOBSON, F.R.S., chairman of the Atmospheric Pollution Research Committee, presented a report on the progress of the investigations carried out under the committee. Systematic observations in connection with the intensive survey of the pollution in and around the city of Leicester were begun on April 1. During the preceding four months the survey staff was occupied in installing standard measuring apparatus at twelve sites, and in certain routine observations. The decision of the authorities to equip and maintain a station for regular meteorological observations was welcomed.

The conference recorded its appreciation of the assistance given by the public analysts of Glasgow, Hull and Sheffield, in an investigation of the possibility of combining a dust filter with apparatus for the determination volumetrically of sulphur dioxide in the atmosphere. It endorsed an interesting proposal made by the research committee that a meeting should be convened of public analysts and others directly responsible for making observations on behalf of co-operating bodies, to discuss technical problems and to interchange ideas on the measurement of atmospheric pollution.

Mr. Brownhill Smith retired from the chairmanship of the conference, having served for three consecutive years. Alderman David Adams, a representative of Newcastle-upon-Tyne, was elected chairman for the ensuing year.

The Estimation of Nitric Oxide in Gas*

By H. HOLLINGS, M.Sc., M.Inst. Gas E. (Chief Gas Chemist, Gas Light and Coke Co.)

IN a paper presented to the Institution of Gas Engineers last year on " The Formation of Nitrogenous Gum during the Storage and Distribution of Gas " reference was made to an apparatus for the continuous estimation of nitric oxide in coal gas. This apparatus is now made by Griffin and Tatlock, Ltd., and is illustrated.

As in the "spot" test, the method for the continuous estimation of nitric oxide is based on that of A. Guyer and R. Weber (" Brennstoff Chem.," 1933, 14, 405) in which nitric oxide is oxidised with acid potassium permanganate, the oxidised product trapped in Griess reagent and the resulting coloration matched against the colour produced by adding a standard solution of sodium nitrate to the original, uncoloured Griess reagent.

Method of Operation

Dust-free crude gas, adjusted to a constant pressure by allowing part of it to bubble out to air through butyl phthalate (chosen because of its low vapour pressure) in a bubbler B, passes through a capillary C. The head of butyl phthalate is adjusted to give a rate of flow of about 0.5 cu. ft. of gas per hour. The gas passes upwards round a glass spiral A, down which is flowing the caustic soda solution (i). If the gas to be tested be purified gas containing very little gum, no caustic soda need be used, while for some crude gases containing high concentrations of ammonia, it may be necessary to insert an acid wash bottle between spirals A and G, or at the inlet to the apparatus.

The rate of flow of the caustic soda solution is fixed at 35-45 c.c. per hour by controlling the flow of air into the solution by adjustment of the length of the capillary tube D. The gas thus freed from hydrogen sulphide and hydrogen cyanide then passes through a small head of acid permanganate at E. The sludge formed at this point falls into the tube F, from which it can be drained. The gas passing up the spiral G is scrubbed by acid potassium permanganate. The flow of the permanganate is controlled at about 70-80 c.c. per hour by adjustment of the capillary H. The gas passes up the tube J, which prevents flooding in the event of a blockage of the spiral, and into the Griess scrubber K, where the oxidised nitric oxide is removed. The coloured Griess reagent flows into the large bulb L, where it is stored, protected from light. The rate of flow of the Griess reagent is adjusted to 35-45 c.c. per hour by means of the capillary M.

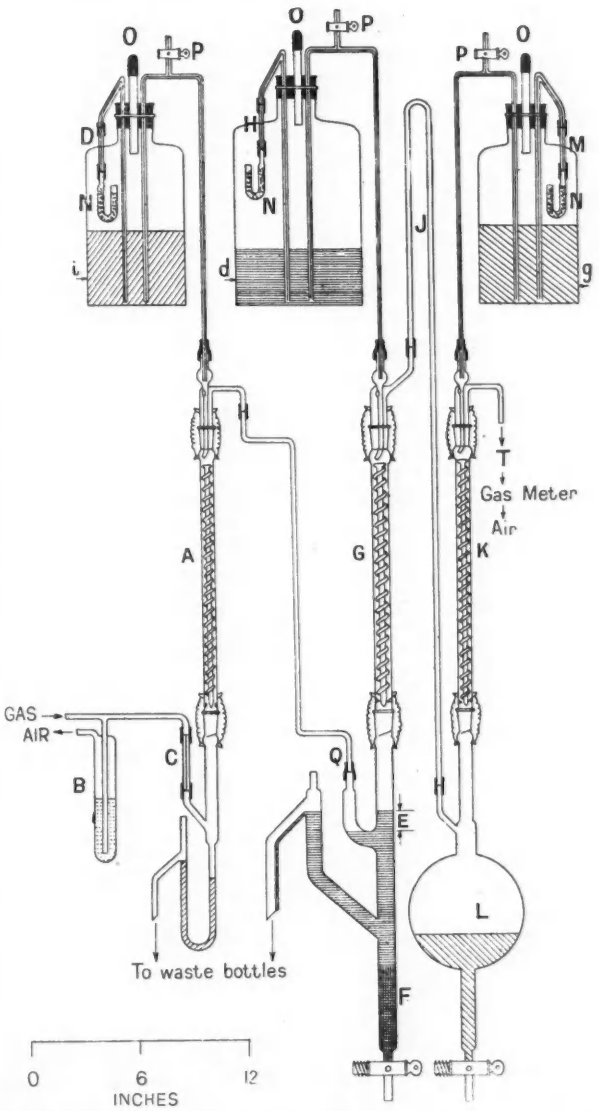
After leaving the Griess scrubber, the gas passes through a trap tube T containing soda-lime and through the gas meter out to air.

The air entering each solution is caused to pass through barium peroxide hydrate in the U-tubes N, N, N to remove nitric oxide in the air. Barium peroxide hydrate may be prepared by spreading a paste of anhydrous barium peroxide and water on a tile, leaving it to set and later breaking the mass into small pieces.

Necessary Reagents

The necessary reagents are :—

(a) Distilled water free from oxides of nitrogen.
(b) A solution of sulphuric acid (25 per cent. by weight).
(c) A solution of potassium permanganate (2.77 per cent. by weight).
(d) A solution of acid permanganate. This should be prepared as required by mixing one part by volume of (b) with nine parts of (c).
(e) A solution of sulphanilic acid. 600 ml. of (a) are boiled and 4 g. of sulphanilic acid added. After cooling, 200 ml. of glacial acetic acid are added and the solution made up to one litre with (a).
(f) A solution of alpha-naphthylamine. 2.52 g. of the material are dissolved in 200 ml. of cold glacial acetic acid and the volume made up to 1 litre with (a). This solution is kept in a coloured bottle.
(g) A solution of Griess reagent. One part by volume of (e) is mixed with one part of (f) and then diluted to 14.3 parts with (a). This solution should be made up when required and not stored prior to use.



Apparatus for the continuous estimation of nitric oxide in gas.

(h) A solution of sodium nitrite (A.R.) containing 0.027 g. per litre.
(i) A solution of caustic soda (10 per cent. by weight).

The solutions are poured into the bottles through funnels placed in the wide tubes (O) fitted through tightly-fitting rubber stoppers. The flow of solutions is started by the application of pressure through O; the rubber caps are then replaced. The flow of solutions may at any time be stopped by opening the taps, P, P, P.

After gas and reagents have passed through the apparatus

* From a paper presented at the annual meeting of The Institution of Gas Engineers on Tuesday.

for at least half-an-hour, Griess reagent is flushed down the last spiral. This can be done most effectively by removing the rubber cap on the reservoir bottle. The reagent is drained through the tap, the latter closed, and the gas meter read. The apparatus is then left running for such a period as is required (*e.g.*, ½ hour to 48 hours). At the end of this period the Griess reagent is again flushed down the spiral, drained out of L into a measuring cylinder and the meter read. The volume of the coloured Griess reagent is measured (V ml.) and 100 ml. of the solution transferred to a Nessler glass. 100 ml. of the unused reagent from the reservoir are placed in a similar Nessler glass and solution (h) is added from a 1 ml. micro-burette until the same depth of colour is produced as in the test solution. As the colour develops slowly, five minutes should elapse before each addition of nitrite is made, and fifteen minutes before the final matching.

If the volume of gas passed be X cu. ft. at 60° F. and 30 in. mercury, saturated with water vapour, corrected, if required, for loss of carbon dioxide and other substances, and if the volume of nitrite solution be Y ml., then the concentration of nitric oxide in parts per million is obtained from the following expression:

$$\text{Nitric oxide, p.p.m.} = \frac{VY}{100X}$$

When changing over from one gas to another, the caustic soda and the permanganate solutions, as well as the Griess reagent, should be flushed down the spirals by removing the rubber caps, and the permanganate drained away before starting a new run.

Before the permanganate spiral finally chokes with the accumulation of sludge, the rubber connection Q and the springs on the bottom joint are removed and the bottom section slid down in the clip until the column can be removed for cleaning with sulphur dioxide or a hot solution of oxalic acid. A spare spiral is then fitted in the apparatus and used until it also requires cleaning. All ground joints should be lubricated with Adeps Lanæ or other suitable tap grease.

Results

The apparatus has been found to give good agreement with the "spot" test. With gases containing high concentrations of hydrogen sulphide, hydrogen cyanide, ammonia or nitric oxide it may be necessary to increase the rates of flow of the caustic soda, permanganate and Griess solutions, but generally the rates of flow given are satisfactory. The rate of accumulation of sludge depends on a number of conditions such as gas quality, temperature and depth of seal at E, but with well-made spirals, never less than 15 mm. apart, the apparatus will run continuously for periods up to 48 hours without blockage.

The apparatus was devised by W. R. Dudden, M. N. Gladstone, W. J. Gooderham, and A. R. Morcom, in the Fulham laboratory of the Gas Light and Coke Co.

Alleged Passing Off

Law Court Judgment

ON Tuesday in the Chancery Division Mr. Justice Farwell gave judgment in the action by Macleans, Ltd., against J. W. Lightbown and Sons, Ltd., in respect of alleged passing off of sweetmeats. There was a cross motion by J. W. Lightbown and Sons, Ltd., against Macleans, Ltd., to rectify the register by striking the trade mark Mac off the register.

His lordship, in giving judgment, traced the history of the plaintiff, and said one of the results of Macleans putting on the market and largely advertising this stomach powder, was, that it obtained a large sale. But his lordship was not concerned with that part of the case. What he had to deal with was the dealing in and offer for sale a certain medicated sweetmeat. Defendants were wholesale confectioners. In 1935 the plaintiff company put upon the market and offered for sale a certain type of lozenge made up in the form of a sweet, or sweetmeat. These sweets were put on the market by plaintiff under the name of Macs, and were described as antiseptic throat sweets. Plaintiffs expended considerable sums of money in advertising Macs sweets. It was not till 1936 that the defendants first put on the market a medicated sweet. They made up a sweet which contained a small portion of powder made in accordance with Professor Maclean's prescription. These sweets the defendants put on the market under the name of Merrimac. It had been proved to his lordship beyond all question that there was genuine confusion with regard to these Merrimac sweets, and plaintiffs' sweets, and it was proved that there was a serious possibility of confusion in the future, to the extent that defendants' sweets would be confused as and for the plaintiffs' sweets. His lordship came to the conclusion that this was a deliberate attempt on the part of the defendants to milch from the plaintiffs the benefit of their reputation in connection with these particular sweets. No trader could complain of honest competition. But no trader was entitled to steal the property of his rival by endeavouring to induce the public to believe that the goods that were being offered for sale were the goods of a rival firm. The defendants had succeeded to some extent. Under these circumstances the plaintiffs were entitled to succeed in the action. And he granted the plaintiffs an injunction, and there would be an inquiry as to damages. The defendants must pay the costs of the action.

His lordship proceeded to deal with the defendants' motion for the rectification of the register by deleting the plaintiffs' trade mark Mac from the register. The evidence on the point was plain. There never was any sale of the goodwill of the business which held the trade mark, and the passing of the trade mark, and therefore the assignment was ineffective. The right order on the motion was to rectify the register by expunging from it the assignment of the trade mark Mac to the plaintiff company. The costs of this motion must be paid by the plaintiff.

The Institute of Physics

Annual General Meeting

THE annual meeting of the Institute of Physics was held on May 26. After election of the officers and completion of the panel of the board, it was announced that the following would take office on October 1: President, Mr. C. C. Paterson; vice-president, Professor W. Makower; hon. treasurer, Major C. E. S. Phillips; hon. secretary, Professor J. A. Crowther; new members of the board, Professor J. Chadwick and Mr. D. C. Gall.

The annual report showed that the membership had continued to increase in a satisfactory way, especially as the standard required for corporate membership is maintained at a high level. The membership at the end of the year was 902. An informal discussion on the training of industrial physicists was held during the year, at which representatives of nearly every university and college in Great Britain and Ireland, of firms employing physicists and of research associations and Government establishments were present. As a result a scheme was inaugurated whereby registered students of the Institute are enabled to gain first-hand experience of industrial research and development work in physics during their vacations. The report recorded that in its first year this scheme proved most successful. A London and Home Counties Branch of the Institute was founded in November.

The general improvement in industry was reflected by the report of an increase in the activities of the appointments register. A suggested form of contract under which a qualified physicist might reasonably be expected to serve was issued by the Board during the year.

Chemical Industry in the United States

The World's Largest Producer and Consumer

MR. H. O. CHALKLEY, Commercial Counsellor to the British Embassy at Washington, states in his report on economic and commercial conditions in the United States, published by the Department of Overseas Trade (H.M. Stationery Office, 3s.), that the United States continues to hold its position as the world's largest producer and consumer of chemicals. The industry enjoys a favourable position with substantial domestic sources of supply of so many of its basic raw materials, a huge domestic market and an extensive export outlet for the products. It continues to expand as steady progress is made in the development of new products and in the improvement of manufacturing methods.

Development of Dyestuffs Industry

The extent of the development of the dye industry, which is sheltered behind a high tariff wall, is shown in an increase of annual production from 4,500,000 lb. in 1914 when the manufacture of coal tar dyes was virtually a German monopoly, to 101,817,000 lb. in 1935, and in the resultant ability of the industry to supply 90 to 95 per cent. of domestic requirements and to export substantial quantities of elementary low priced dyes. This increase has established the United States as the second largest factor in the world dye trade for it now supplies from 20 to 25 per cent. of world production against the German share of 35 per cent. and the contribution of the United Kingdom, the third largest producer, of about 10 per cent.

Alkalies are in increasing demand particularly from the glass, textile, rayon and chemical processing trades, and it is expected that consumption of both soda ash and caustic soda will create a record in 1936 and will be 10 per cent. in excess of the total for 1935 when sales of soda ash and caustic soda amounted respectively to 1,025,000 tons and 716,000 tons. Even in that year sales had reached a point which was 9 per cent. higher than the previous record established in 1929. The accumulation of excess stocks of caustic soda in 1935 resulting from pronounced activity of electrolytic plants in producing chlorine has already been absorbed. The present estimated annual production capacity for soda ash is 3,520,000 tons.

Leading Position in Sulphur Production

In sulphur production the United States holds a leading position, for in Texas and Louisiana it has the largest known reserves in the world. Domestic output of brimstone represents 70 per cent. of the world total or about 25 per cent. of world sulphur production in all forms. In recent years the industry has shown marked stability and in 1935, influenced by the trend of general industrial production, output of crude sulphur reached 1,632,590 tons, an increase of 15 per cent. over 1934, and a further substantial rise is indicated for 1936, estimated production having amounted to nearly 1½ million tons in the first nine months. In July, 1934, a market agreement was concluded between the Sulphur Export Corporation (United States) and the Central Sulphur Sales Bureau (Italian) which was interrupted during the period when sanctions were being applied and revived later in 1936. No advantage has yet accrued to domestic sulphur producers as a result of the cessation of imports of pyrites from Spain, which normally average 400,000 to 500,000 tons per annum, but should unsettled conditions in that country continue for any further extended period it is probable that sales of brimstone sulphur will benefit materially, dependent upon the extent of the present stocks of pyrites held in the United States. As regards sulphuric acid its normal trend of production follows closely that of industrial production. Sales in 1934 and 1935 amounted respectively to 5,590,000 and 6,047,000 tons, and a further advance will have been made by the end of 1936.

In the fertiliser industry large supplies of the principal materials are readily available. The production of potash, for instance, passed all previous records in 1935 with a total of 357,974 tons; super-phosphates are made at some 200 plants with an aggregate capacity of 7 million tons, far in excess of requirements even in the best years, while the volume of production of synthetic nitrogen in the United States, representing over 10 per cent. of world production, is second only to that of Germany. Domestic capacity for mixing fertilisers is estimated at 12 million tons which compares with a high level consumption of 8 millions in 1930 and sales of slightly in excess of 6 million tons in 1935. This vast over-capacity is responsible for unstable price conditions, and although the industry is at present working under a voluntary price agreement its success in promoting stability remains in doubt. Demand for fertilisers, which is primarily influenced by farm income, should be extensive during the 1936-7 season and is expected to be the largest since 1929-30.

Carbon Black Restriction

Carbon black production is being restricted by leading manufacturers to bring it into closer alignment with demand. In 1935 production reached 352,740,000 lb. (exceeded only by the totals of 1929 and 1930), consumption increased substantially and stocks were materially reduced. The steady diminution in stocks since 1931, when they had reached excessive proportions, has resulted in stabilisation of prices at profitable levels.

In the manufacture of motor car tyres where from 80 to 85 per cent. of carbon black output is consumed, the amount of the material used per tyre has risen from 1.9 lb. in 1925 to about 4.1 lb. at the present time. With an indicated heavier production of tyres and a greater activity in the ink and paint industries during the last quarter of 1936 it is expected that consumption for the year will reach 420 million lb.

Other points which might be mentioned are the experimental work in the production of iodine which led to the establishment of a new domestic industry in 1932 and the emergence of the United States in 1936 as the world's second largest producer (average annual output, principally from oil well waters, 276,500 lb.); also the production in 1935 of 100 million lb. of synthetic resin (mainly of coal tar origin), an increase of over 50 per cent. in the past two years and over 50 times as great as the production registered 15 years ago.

The Petroleum Industry

The position in the petroleum industry in recent years has been one of increased production and domestic demand accompanied by a reduction in stocks, little change in the direction of imports and exports, and no signs of weakness in prices.

This satisfactory condition may be attributed to the more effective enforcement of State pro-ration schemes and of supporting legislation; improved co-operation between Federal and State governments and a willingness on the part of individual producers in areas where no regulatory measures are in force to co-operate in the general programme, though it is conjectural whether this stabilisation could be maintained should new large sources of supply be uncovered. In the past three years the industry has not been subjected to demoralising influences such as attended the discovery of the East Texas and Oklahoma City fields with their huge potential production. Only one new major field was opened up during 1935, situated at Rodessa in Louisiana, and this was probably the most important discovery in the United States since that of East Texas. At the close of 1935, however, the Rodessa field had reached an average daily production of some 18,000 barrels only, though continued expansion had brought this daily average up to nearly 60,000 barrels in the last quarter of 1936

The possibility of froth flotation in connection with the preparation of clays for ceramic use was undertaken in co-operation with the Tennessee Valley Authority to determine whether local domestic clay might be utilised for the manufacture of porcelain ware. A great deal of the procelain used in the United States is imported because of the supposed absence in this country of satisfactory clay from which to manufacture porcelain. Except for the presence of mica and other deleterious constituents, certain of these local domestic clays might be satisfactory. New reagents for collecting minerals were needed, but after developing them the work was simplified.

It is possible first to float off the colloidal matter, which in this instance is mainly halloysite; second, the more granular kaolinite concentrate; next, a semiclay mineral, of granular characteristics, called hydromica and probably actually a sericite of low alkali-metal content; then, the fine, unweathered mica; then, the fine quartz; and finally, the feldspar in the mixture is left. These flotation tests, using suitable reagents, resulted in a good separation of the clay from undesirable impurities, although certain difficulties in the manipulation during the casting of the mould have been reported.

New Development in Clay Preparations

These favourable results, which should have possibilities in connection with clays for various purposes, indicate that it is a new development in clay preparation. They have also shown that a real need exists for better American clays. Imports of special clays total over 200,000 tons during our worst depression years and rise to nearly one-half million tons in times of prosperity. American clays are mixtures of several clay minerals and finely divided extraneous minerals. As a rule, the clay minerals are in the wrong proportions for best utilisation.

The Bureau of Mines has recently applied a new tool to clay fractionation. It is froth flotation, which in the past has been used only for removing discolouring impurities. The results on two clays tested in a preliminary way show that it is possible to prepare fractions of a clay that are ceramically very different. By recombining some of the fractions in more desirable proportions, better wet-working and burning characteristics are obtained. This separation gives a means of control that was previously lacking and was remedied only by using clays from a wide variety of sources.

Flotation Applied to Minerals

The flotation reagents that worked well on clays had shown unusual behaviour on the mica, quartz, and feldspar in these clays, so a small amount of work has been done on quartz-feldspar mixtures and mica mixtures with each. Whereas floatation separation of feldspar-quartz mixtures in the past has resulted in flotation of feldspar away from quartz, this new style of reagent floats quartz in the presence of feldspar. Due to dwindling supplies of high-grade feldspar in the Appalachian East, such a separation is of great importance.

Ground mica, as fractionated by flotation, is also of interest. It is possible to obtain mica fractions of very low density per c. ft.—a desirable characteristic. It is also possible, by this method, to eliminate gritty materials (quartz and feldspar) very simply. Agglomerate concentration methods, as mentioned above in connection with kyanite, have also been initiated and found applicable, at least to some of these mixtures. The field is attractive; and now that we, seemingly, have a satisfactory set of mineral-filming agents, the application of flotation and agglomeration in this field should be pushed rigorously.

It is hoped that this application of froth flotation and table agglomeration can also be extended to a number of other minerals that now are mined only when found sufficiently pure. The diatomites, the pyrophyllites, the pumicites, the gypsites, and other minerals, when occurring as finely divided materials, are usually contaminated and disregarded in spite of their great abundance and closeness to markets.

An air elutriator developed by the Bureau to separate powder into several sizes with considerable precision has been applied to the separation of powdered non-metallic materials in connection with research on ground talcs, pyrophyllites, cements, and other non-metallics. Another method of sizing and separating particles has been recently discovered, which utilises their tendency to polarise electrically during heating or cooling. This method of separating, which for convenience may be called pyroelectric separation, has been applied to the removal of mica from beach sand in California. It is entirely possible that other applications of this principle may be expected. For example, a method for the separation of feldspar from quartz (other than by handpicking) has been needed for many years.

Chemistry in Food Production

38th Bedson Lecture

THE 38th Bedson Lecture was delivered by Sir E. John Russell, D.Sc., F.R.S., director of the Rothamsted Research Station, at Armstrong College, Newcastle-on-Tyne, on May 21, his subject being "Applications of Chemistry to Modern Food Production." Professor G. R. Clemo was in the chair, and after the lecture the 11th annual Bedson dinner was held.

Sir John Russell approached the subject of his lecture by a short survey of British agriculture. His conclusions were that we are to-day eating less bread, but more meat, vegetables, butter and cheese, than in 1913, and that although home production of milk, potatoes, and vegetables was high the home production of butter and flour was low, a matter of significance from the point of view of defence. The classical approach of the chemistry to the problem of plant growth was to find a substitute for farmyard manure, and at the time this was first broached it was suggested that a mixture of simple salts in such a proportion that the ultimate analysis approximated to that of manure would be sufficient. This was only partly true: the simple salts were highly effective and were extensively used under the name of artificial fertilisers, but the optimum proportions could be ascertained only by field trial. Several interesting consequences followed from the circumstance that these fertilisers contained not only the specified plant nutrient, but also various amounts of other elements.

Less is known of the more complex problem of the actual elements necessary to plant growth and their action. Science is advancing along two lines of investigation: trial and error methods and systematic statistical investigation. With regard to the function of the necessary elements a study of plant deficiency diseases has proved useful. Examples of the results are, that the addition of borax in certain conditions caused better growth of certain plants; and that traces of manganese, copper and other elements appear to be essential to good growth. Some plants will take up particular nutrients more readily than others so that the correct choice of a fertiliser will lead to preferential growth of these plants, thus causing modification in a mixed herbage such as that of meadow or pasture land. The soil is now receiving attention from chemists, but as yet the results are not very far advanced. One method of attack is to carry out extensive field experiments in different types of soil with the same group of fertilisers and to correlate the results with those of chemical examination. The method is slow and has to be rigorously controlled on a statistical basis to reduce the probability of error.

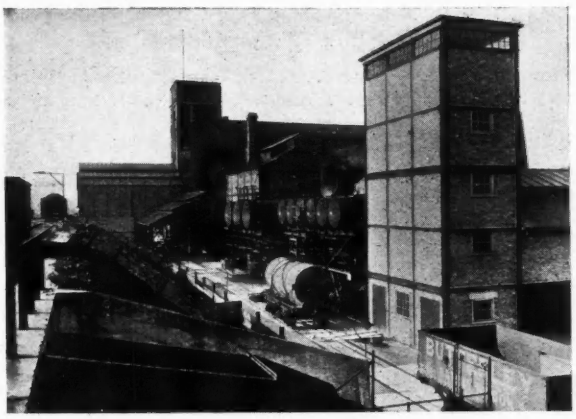
Finally, Sir John Russell dealt with the organic constituents of manure, and described how experiments were carried out from two directions, *i.e.*, the investigation of extracts of manure and the use of known organic compounds in growth tests. Examples of compounds exericising a marked effect on the growth are indole-acetic acid and naphthalene-acetic acid.

TO FURTHER THE MANUFACTURE OF GLYCERINE from sugar, in Italy, 10,000 quintals of sugar have been released free of tax for this purpose up to September 30.

The Fuel Research Station

Annual Visiting Day

OVER 400 scientists, industrialists and technologists were present on Tuesday at the Fuel Research Station as guests of the Department of Scientific and Industrial Research to see the latest developments in research on coal. They were received by Sir Harold Hartley, chairman of the Fuel Research Board, and Dr. F. S. Sinnatt, director of fuel research. The visitors examined the plants for the cleaning and washing of coal and the examination of subsidiary problems; for the carbonisation and hydrogenation of coal; the hydrogenation of tar and its distillation products; the burning of coal in marine boilers and the study of pulverised fuel.



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View of the Fuel Research Station showing the new sampling building and coal and tar storage.

Among the experiments of special interest were those dealing with the complete gasification of coal by passing steam over it in water-gas plants. The method is being investigated firstly, as an alternative means of supplying gas for the gas industry, and secondly, as a means of producing gas which, by treatment with catalysts, may be synthesised into liquid fuels.

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Experimental plant for synthesis of hydrocarbons from mixtures of carbon monoxide and hydrogen.

Much of the work on the hydrogenation of tar and coal aims at increasing the range of products obtainable. During the year, methods have been worked out by which aviation spirit can be produced instead of ordinary motor spirit. It was stated that it had been found possible to obtain a volume of aviation or motor spirit equal to the volume of the low temperature tar treated, while 140 gal. of aviation or motor spirit have been produced by the hydrogenation of one ton of coal. In the search for new products, the investigation of processes for the production of lubricating oils has been continued, and it has now been found possible to make such oils by treatment of the products obtained by synthesis from water gas. A plant is in operation capable of producing about 2 gal. of liquid products a day by treating mixtures of hydrogen and carbon monoxide with a suitable catalyst. Lubricating oil has been made from certain fractions of this material.

Grit and Sulphur in Flue Gases

An investigation is being made of the elimination of grit and sulphur from flue gases, the object being to devise a scheme suitable for relatively small units. The visitors were also shown the results of the work done on the effect of mixing small proportions of high volatile coal with low volatile coal, with the object of enabling low volatile coal to be burnt completely in an ordinary Lancashire boiler. Work is also in progress on the use of pulverised fuel in internal combustion engines and upon the use of producers in motor vehicles.

A problem studied during the past year has been the treatment of coal to eliminate coal dust. It has been shown that if a small proportion of oil (3 to 20 lbs. depending on the coal) is added to each ton, the coal is dust-proofed and no appearance of dust can be detected.

United States Potash Industry

Production in 1936

POTASH materials produced in the United States in 1936, according to reports of producers to the Bureau of Mines, amounted to 431,470 short tons, containing 247,340 short tons of K_2O. This was an increase over 1935 of 20.5 per cent. in gross production and of 28 per cent. in K_2O content.

Sales of domestic potash materials in 1936 amounted to 396,690 tons, representing 222,810 tons of K_2O, a decrease of 2.5 per cent. in gross sales and of 0.85 per cent. in K_2O. The reported value f.o.b. plant of material sold was $6,969,190, an increase of 40 per cent. over 1935. The average value per ton in 1936 was $17.57 against $12.27 in 1935. The average value of the K_2O per unit was 31 cents. in 1936; in 1935 it was 22 cents. Potash material sold in 1936 averaged 56.16 per cent. Of the total sales of potash material, 348,186 tons containing 209,271 tons of K_2O, was muriate, the remainder being classed as manure salts, sulphate, sulphate muriate, carbonate, and plant waste.

Decrease in Domestic Consumption

The apparant consumption of potash in the United States in 1936, based on the sum of domestic sales and imports and the subtraction of exports, amounted to 784,033 short tons of potash material containing approximately 377,133 tons of K_2O, an average of 48 per cent. This indicates a decrease in domestic potash consumption of 16 per cent. in gross tonnage and of 10 per cent. in K_2O equivalent in comparison with 1935. The total of imports and sales of domestic products (including export sales) was 890,389 tons of material containing 440,935 tons of potash (K_2O) valued at $19,280,118. Of this amount domestic producers supplied 45 per cent. of the gross tonnage, containing 51 per cent. of the potash, compared with 40 per cent. and 48 per cent., respectively, in 1935. The total trade thus calculated showed a decrease of 12 per cent. in gross material and of 5 per cent. in potash (K_2O), with an increase of 10 per cent. in value as compared with 1935, reflecting a marked increase in the proportion of concentrated salts sold.

Letters to the Editor

Two Replies to External Graduate

SIR,—We have read with interest the letter signed "External Graduate," in your issue of May 29. We will not comment on the letter with the exception of the latter paragraph, from which it appears that there are members of the profession who are unaware of the activities of the British Association of Chemists.

Considering the interest which your correspondent takes in the welfare of the profession it is difficult to imagine that he has not read something of the benefits of membership to which you have frequently referred in your columns, apart from the advertisement which has appeared in your journal for many years.

Many chemists appear satisfied that their interests require no safeguard; they overlook the fact that firms may reorganise or amalgamate which may result in the dismissal of staff with many years' service. When such an unfortunate occasion arises they appreciate that if they had taken up membership of the Association their interests would have been protected by the legal aid department, thus ensuring fair terms on the termination of their engagement, and the support of a strong insurance fund until they could obtain a suitable appointment with remuneration appropriate to their status, and the assistance of the Association to obtain such a position.

Employers requiring men with ability and initiative come to the Association, and we find that they are willing to pay substantial salaries to chemists with good qualifications, experience and initiative. No chemist, particularly the married man, can afford to ignore the benefits of the Association's unemployment insurance fund, since the modest annual payment assures up to £4 per week for twenty six weeks.—Yours faithfully,

C. B. WOODLEY,
General Secretary.

British Association of Chemists,
175 Piccadilly, W.1.

SIR,—Every sensible chemist is in comp'ete agreement with "External Graduate" in that it is high time the rank and file of the chemical profession bestirred themselves, but *not* "to evolve some strong association to represent them." Rather should the clarion call be to support the association which, evolved twenty years ago for just the purpose "External Graduate" pleads, has been foremost of all chemist societies in its endeavour to bring about complete representation, in other words, a register of chemists.

The British Association of Chemists is the one professional body whose constitution enables it to undertake the safeguarding of every aspect of the chemical profession. The high standard required of applicants for membership ensures competence, and dignity of professional ethics. Degrees of membership exist also for probationers and students. The chemist's economic interests are powerfully guarded, and the B.A.C. is solely responsible for the institution of the precedent of three months' notice or salary in lieu on dismissal of chemists.

As a member of many years' standing, and one who has suffered conflict, and a week's notice, from employers both British and foreign, it is possible for me to speak strongly on the benefits of the legal aid department which obtained for me, on two occasions, full three months' salary, without recourse to law courts. The extremely useful unemployment insurance scheme provides the unemployed chemist with an income payable in a dignified manner. Married chemists cannot afford to ignore this activity of the Association. Many other activities are undertaken on the profession's behalf. Therefore no need exists to grouch or evolve another society of chemists. Union is strength, and every chemist having his own welfare and that of the profession, at heart, should not hesitate to support what is already the most representative and active association, and an association, moreover, always ready to co-operate with other societies for the benefit of the profession at large.—Yours faithfully,

"YZ."

Death of Professor A. G. Perkin

A Pioneer in Colour Chemistry

PROFESSOR ARTHUR GEORGE PERKIN, F.R.S., of Leeds University, a pioneer in colour chemistry, died at his home at Headingley, on Sunday, at the age of 75. The second son of the late Sir William Henry Perkin, founder of the coal tar colour industry, he was born at Sudbury, Middlesex, near which village was the colour factory of Perkin and Sons. He followed his father to the City of London School, one of the few schools at which in those days science formed part of the curriculum. Afterwards he studied mainly at the Royal College of Chemistry under Frankland and Guthrie, carrying out a short investigation which was published by the Chemical Society in 1880. After a year at Anderson's College, Glasgow, under Professor E. J. Mills, he entered the dyeing department of the Yorkshire College, afterwards the University of Leeds, under the late Professor J. J. Hummel, with whom he carried out researches in the colouring matters of logwood and brazilwood.

In 1882 he was appointed chemist in the alizarine factory of Hardman and Holdens, Manchester, working under R. W. Williamson, and on the retirement of the latter in 1888 was appointed manager. His thirst for research, however, led him in 1892 to accept the position of lecturer and research chemist in the dyeing department of the Yorkshire College in succession to Professor Leicht.

During the war he carried out investigations on explosives and was also in charge of work for the British Dyestuffs Corporation in Leeds University, having particular reference to dyestuffs and intermediates. He was appointed Professor of Colour Chemistry at Leeds in 1915 and was Dean of the Faculty of Technology from 1922 to 1924. In 1903 he was elected a Fellow of the Royal Society, which awarded him the Davy medal in 1923. He was a Fellow of the Royal Society of Edinburgh, of the Institute of Chemistry, of the Chemical Society, and of the Biochemical Society, and a member of the Textile Institute and of the Society of Dyers and Colourists. In 1916 Professor Perkin was elected an honorary member of the Pharmaceutical Conference and in 1923 an honorary member of the Pharmaceutical Society, these being rare distinctions. He was a freeman of the Leathersellers' Company.

In addition to his contributions to research, he published, with Dr. A. C. Everest, "The Natural Organic Colouring Matters," which has become a standard work. On retiring from his chair he was accorded the title of Emeritus Professor, and the University also conferred on him the degree of D.Sc.

Ilmenite Production in British Malaya

CONTRARY to recent reports which claim that ilmenite is bringing wealth to native miners in Malaya, the annual output of the mineral is not large. While there are no actual figures of output, exports of ilmenite from British Malaya were 50 tons in 1934, less than 3,000 in 1935, and 10,314 in 1936. The increase in exports of ilmenite has been brought about by greater consumption of the product for the manufacture of titanium pigments used in the manufacture of paints and rubber goods. Japan is one of the most prominent purchasers of ilmenite shipped from British Malaya.

The Chemical Age Lawn Tennis Tournament

Results of First Round Matches

THE matches in the first round of the seventh annual CHEMICAL AGE Lawn Tennis Tournament were completed on Tuesday, and the results, together with the full list of competitors, are given in this and following pages. Except in the case of the finals, players drawn against each other must make their own arrangements for playing off the match on a court mutually agreed upon. In the event of disagreement the first name drawn has the right to choose the ground. The best of three advantage sets will be played in each round.

It is important that competitors should bear in mind the closing dates for the various rounds as shown at the head of each of the two draws. Results must be sent to the Editor of THE CHEMICAL AGE immediately after the match, and must in any case reach him not later than first post on the day following the final day for playing off the round.

Whilst there will be no new draw for each successive round, a draw will be made for the right of choice of ground and competitors will be notified accordingly.

Alphabetical List of Players

The following alphabetical list indicates names of all competitors in The Chemical Age Lawn Tennis Tournament. Addresses and telephone numbers are given to facilitate communication between players.

Allen, F. R. O. (Nobel Finishes, Ltd., Slough, Bucks. 'Phone: Slough 528; ext. 55).
Barnes, S. (British Oxygen Co., Ltd., Angel Road, Upper Edmonton, N.18. 'Phone: Tottenham 2488).
Baxter, A. (United Yeast Co., Ltd., 238, City Road, E.C.1. 'Phone: Clerkenwell 0303).
Bennett, R. A. J. (Nobel Chemical Finishes, Ltd., Slough, Bucks. 'Phone: Slough 528; ext. 55).
Blow, D. G. (British Drug Houses, Ltd., 18-30, Graham Street, City Road, N.1. 'Phone: Clerkenwell 3000).
Bowden, E. F. (Le Grand, Sutcliff, and Gell, Ltd., The Green, Southall, Middx. 'Phone: Southall 2211).
Bowler, H. (Nobles and Hoare, Ltd., Cornwall Road, S.E.1. 'Phone: Waterloo 4694).
Brewer, G. (Corn Products Co., Ltd., Bush House, Aldwych, W.C.2. 'Phone: Temple Bar 2091).
Britnell, E. (County of London Elec. Supply Co., Ltd., Generating Station, Creeks Mouth, Barking. 'Phone: Rippleway 2461).
Burnham, C. J. (C. J. Hewlett and Sons, Ltd., 35, Charlotte Street, E.C.2. 'Phone: Bishopsgate 1172).
Chaloner, S. E. (Monsanto Chemicals, Ltd., Ruabon, Denbighshire. 'Phone: Ruabon 3).
Champkin, R. A. (B. Laporte, Ltd., Kingsway, Luton, Beds. 'Phone: Luton 891).
Copp, C. G. (Doulton and Co., Ltd., High Street, Lambeth, S.E.1. 'Phone: Reliance 1241).
Cornelius, L. (Stafford, Allen and Sons, Ltd., 7, Cowper Street, Finsbury, E.C.2. 'Phone: Cle 2100).
Cosgrove, A. (Hanovia, Ltd., Bath Road, Cippenham, Slough. 'Phone: Burnham 500).
Crosse, F. G. (Society of Chemical Industry, 46-7, Finsbury Square, E.C.2. 'Phone: Met 3773).
Darton, F. (J. Buchanan and Co., Ltd., 26, Holborn, E.C.1. 'Phone: Holborn 6183).
Eager, J. (Griffiths Bros. and Co., Ltd., Macks Road, Bermondsey, S.E.16. 'Phone: Bermondsey 1151).
Eastwell, J. S. (British Xylonite Co., Ltd., Hale End, London. 'Phone: Larkswood 2345).
Eyres, A. F. (Johnson Matthey and Co., Ltd., Hatton Garden, E.C.1, 'Phone: Hol 6989; ext. 49).
Giltrow, L. (Williams (Hounslow), Ltd., Hamworth Road, Hounslow. 'Phone: Hounslow 1166).
Goudie, A. W. A. (Corn Products Co., Ltd., Bush House, Aldwych, W.C.2. 'Phone: Temple Bar 2091).
Gough, C. G. (Lever Bros., Ltd., C.T.D/G. Dept., Port Sunlight, Cheshire. 'Phone: Rock Ferry 500; ext. 110).
Grape, L. F. (Borax Consolidated, Ltd., Regis House, King William Street, E.C.4. 'Phone: Mansion House 8331).
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Hayman, R. D. (Doulton and Co., Ltd., 120, Granville Street, Birmingham. 'Phone: Mid 1315).
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Marcar, A. S. (Bovril, Ltd., 152, Old Street, E.C. 'Phone: Clerkenwell 2202).
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The Chemical Age Lawn Tennis Tournament

Men's Doubles

Players drawn against each other must make their own arrangements for playing off their match on a court mutually agreed upon. In the event of disagreement the first drawn shall have the right to choose the ground. The asterisk (*) indicates the first name drawn. Best of three advantage sets.

First Round	Second Round *Results by* June 21	Third Round *Results by* July 12	Semi-Final *Results by* August 16	Final September 4
*T. P. Williams and C. G. Gough R. D. Hayman and W. Marchant	Williams and Gough, w.o.			
*S. E. Chaloner and W. Speakman C. Thedford and I. Williams	*Chaloner and Speakman, 4-6, 6-1, 6-4			
*R. E. Triggs and R. Tinkler V. Prosser and A. Baxter	*Prosser and Baxter, 6-4, 6-1			
*J. I. T. Jones and R. M. O. Williams W. R. Lewis and S. Barnes	Lewis and Barnes, 6-4, 4-6, 6-4			
*E. T. Hancock and J. K. Woollard W. H. Herridge and J. S. Eastwell	*Hancock and Woollard, 6-4, 7-5			
*J. H. W. Turner and J. Eager R. F. Porter and R. S. Law	Turner and Eager, 3-6, 6-2, 6-1			
*E. Dacre Lacy and F. O'Connor A. E. C. Willshere and L. F. Grape	*Willshere and Grape, 9-7, 6-3			
*L. Giltrow and H. Bowler L. A. Maronge and J. Hudson	Giltrow and Bowler, 6-0, 6-2			
*A. W. A. Goudie and G. Brewer P. E. Healey and G. L. Rolfe	Goudie and Brewer, 6-2, 6-2			
*F. C. Crosse and J. E. Walker A. F. Eyres and W. Hoppe	*Eyres and Hoppe, 8-6, 6-2			
*R. A. J. Bennett and F. R. O. Allen F. D. Hand and P. D. O'Brien	Bennett and Allen, 6-1, 6-3			
*G. W. Hole and C. G. Smith C. G. Copp and E. Smith	*Hole and Smith, 6-3, 6-2			
*R. A. Champkin and A. A. Killick V. D. Thompson and L. Cornelius	Champkin and Killick, w.o.			
*A. J. Truslove and W. E. J. Wakeman J. S. Wilson and A. Tickner	*Truslove and Wakenham, 6-1, 6-4			
*R. Sleap and F. Darton C. J. Burnham and D. G. Blow	Sleap and Darton, w.o.			
*A. W. White and R. Hornsby W. A. Robbins and E. Bowden	*White and Hornsby, 6-2, 5-7, 6-1			

The Chemical Age Lawn Tennis Tournament

Men's Singles

Players drawn against each other must make their own arrangements for playing off their match on a court mutually agreed upon. In the event of disagreement the first name drawn shall have the right to choose the ground. The asterisk (*) indicates the first name drawn. Best of three advantage sets.

First Round	Second Round *Results by* June 21	Third Round *Results by* July 12	Fourth Round *Results by* August 2	Semi-Final *Results by* August 23	Final September 4
C. Thedford E. Pavitt	*bye bye				
*T. P. Williams S. E. Chaloner	Williams, w.o.				
*E. Whittaker C. C. Gough	*Gough, 6-1, 6-4				
*R. D. Hayman I. Williams	Result awaited				
*W. Speakman P. A. Tunstall	*Tunstall, w.o.				
*W. P. Mayers R. E. Liston	Liston, w.o.				
*A. J. Truslove J. I. T. Jones	*Truslove, 6-3, 7-5				
*P. D. O'Brien F. G. Crosse	*Crosse, 6-2, 6-3				
*J. S. Hann A. S. Marcar	Marcar, w.o.				
*R. S. Law D. G. Blow	*Blow, w.o.				
*A. A. Killick R. M. O. Williams	Williams, 6-1, 8-6				
*T. C. Scott-Bloxam G. Hammond	*Hammond, w.o.				
*W. E. Wakeman R. J. Sleap	Sleap, 6-0, 6-0				
*A. Baxter E. Britnell	Baxter, 6-1, 6-2				
*R. F. Porter G. A. Hanson	*Hanson, 6-1, 6-1				
*H. H. Lusty A. W. A. Goudie	*Goudie, w.o.				
*J. E. Hardee P. E. Healey	Hardee, 6-2, 6-2				
*K. W. Hawkes J. H. G. Plant	*Plant, 6-1, 3-6, 6-2				
*R. A. G. Bennett L. A. Maronge	Bennett, 7-5, 6-4				
*L. F. Grape G. L. Rolfe	Grape, 6-1, 6-3				
*A. E. Hughes J. E. Walker	*Walker, 5-7, 10-8, 7-5				
*H. Bowler V. D. Thompson	Bowler, 6-1, 6-2				
*C. G. Copp J. S. Wilson	*Copp, 6-2, 6-2				
*L. Cornelius E. Dacre Lacy	Cornelius, w.o.				
*J. H. W. Turner H. Williams	*Turner, 6-1, 2-6, 6-3				
*W. Oakley A. H. Tickner	Tickner, w.o.				
*F. Darton E. A. Thomsett	*Darton, 2-6, 6-3, 9-7				
*F. D. Hand G. Pugh	*Pugh, w.o.				
*A. Cosgrove E. Rowley	Cosgrove, w.o.				
L. Giltrow W. R. Lewis	*bye bye				

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IMPREGNATING OILS FOR RAILWAY SLEEPERS are now made on a considerable scale by the Budapest Gasworks. This concern has also recently made coal tar available for production of these oils by other tar processing works.

Personal Notes

MISS BERTHA DEXTER, the first woman to be employed in the London office of Nobel's Explosives Co., now part of Imperial Chemical Industries, Ltd., has just retired after 41 years' service. She has for ten years been in charge of the typists' "pool" and the extraordinary growth of the company has given her not only a varied experience of office life but a host of friends. Miss Dexter's retirement was therefore marked by two occasions. On the first, Sir Frank Spickernell, chief of staff, presented her with gifts from the staff—a gramophone with cabinet and records, a typewriter, a standard lamp and a cheque. On the second, a large gathering of the women's staff assembled for a dinner in her honour, and Lady McGowan, wife of the chairman, presented her with the chiming clock given to I.C.I. staff achieving 40 years' service. During this period Miss Dexter has seen the women's staff grow to over 600 at head office alone.

Miss Bertha Dexter.

LORD MCGOWAN was elected president of the National Safety First Association at the annual meeting held in London on May 28.

MAJOR DESBRISAY BLUNDELL MEIN, of Ware, Hertfordshire, a director of Ilford, Ltd., manufacturers of photographic dry plates, and also of the Cellulose Acetate Silk Co., Schweppes, and other companies, left estate valued at £27,058, with net personalty £19,732.

MR. W. E. C. WALKER-LEIGH has joined the board of Cooper, McDougall and Robertson, Ltd.

MR. JOHN JACKSON, formerly of MacArthur and Jackson, Ltd., oil refiners, Glasgow, died on May 29, at the age of 87.

MR. BERNARD LAGER, of Spondon, has been presented with a gold watch from Leech and Neal and Co., colour manufacturers, on the completion of 50 years' service.

MR. ROBERT LYNN, who was employed for 45 years with the United Turkey Red Co., Ltd., in the Leven Valley, died at his home in Middleton Street, Alexandria, on Sunday, at the age of 78.

MR. ALLAN B ROSS, a former chemist with Scottish Oils, Ltd., and a native of Broxburn, is home from Trinidad with his wife for a short holiday. He holds an important post in the cracking plant department of Trinidad Leaseholds, Ltd.

MR. H. V. POTTER, managing director of Bakelite, Ltd., was elected chairman of the British Plastics Federation, the trade organisation of the plastics industry, at the annual meeting of the Federation last week; Major H. C. Parker, a director of Thomas De La Rue and Co., Ltd., was elected vice-chairman for the 1937-1938 session.

DR. FRANK LITHERLAND TEED, who died recently at the age of 78, was for some years in office as public analyst for the City of London. He co-operated with Sulman and Picard in the development of the bromo-cyanide and flotation processes, as used in metallurgical practice. Dr. Teed was a D.Sc. of London University and also a barrister of the Middle Temple.

MR. W. E. WALDRON is retiring after being foreman bleacher at the Eagle Dyeing Co.'s Works, Blackford Bridge, Bury, Lancashire, since November, 1913. He has had a working career of over 59 years, in the course of which he was employed for 20 years at the Harwood Vale Bleachworks, and for seven years by W. A. Rodwell, Ltd., Walkden, after which he went to Blackford Bridge. On May 19, Mrs. J. Barlow, on behalf of the banders, presented Mr. Waldron with a tobacco pouch, and Mr. A. Taylor, on behalf of the workpeople, presented him with a fireside armchair and smoker's cabinet.

Chemical Notes from Foreign Sources

Germany

A NEW RAYON MANUFACTURING CONCERN, the Krefelder Kunstseide A.-G., has been formed in Krefelder with a provisional share capital of 10 million marks.

Austria

MANUFACTURE OF SOAP AND CANDLES will be carried on by the newly-formed Vereinigte Fettwarenindustrie Joseph Estermann A.-G., Vienna 2 (capital 750,000 schillings).

Finland

CAPITAL has been raised for operation of a process for manufacturing liquid motor fuel from peat, wood and waste wood based upon the Bergius hydrogenation process. The first product of hydrogenation is a naphtha-like crude oil from which petrol, lubricating oils, etc., are obtained by distillation.

Russia

SYNTHETIC RUBBER IS NOW TO BE USED exclusively for the manufacture of motor tyres by the Rubber and Asbestos Combinate at Jaroslavl. Driving belts can be made from 100 per cent. synthetic rubber by a process developed by the Research Institute of the Rubber Industry. The process is being tested out at two factories.

Italy

A SYNTHETIC RUBBER MANUFACTURING COMPANY is now in process of formation with State participation.

A NEW regulation restricts the use of the designation "mannitol" to the product obtained from natural manna. Other products including mixtures of mannitol with other materials are no longer allowed to be described by the same name.

Hungary

BAUXITE DEPOSITS IN THE BAKONY DISTRICT are to be exploited by a new company, with a capital of 2 million pengo, formed with participation of the Amsterdam house of N. V. Oxyde Maatschappij voor Ertseen en Metalen.

Japan

SODIUM HYDROXIDE IS TO BE PRODUCED in a monthly output of 1,000 tons by the electrolytic process in a factory now being built by the Nippon Kasei Kogyo K.K.

NEGOTIATIONS FOR AN AGREEMENT between firms in the Japanese formaldehyde industry have broken down. The total annual output capacity is 5,000 tons of which 2,500 tons are produced by Nippon Chisso Hiryo K.K. and 2,000 tons by the Yedogawa Kogyosho.

Weekly Prices of British Chemical Products

THERE are no price changes to report in the London markets for general heavy chemicals, rubber chemicals, wood distillation products, pharmaceutical and photographic chemicals, perfumery chemicals, essential oils and intermediates. In the coal tar products section there have been slight increases in the prices of carbolic acid crystals and toluol and a reduction in the price of pyridine. Unless otherwise stated, the prices below cover fair quantities net and naked at sellers' works.

MANCHESTER.—The chemical market in Manchester this week has been a little more active than it has been for nearly a month, the effect of the holiday influences having pretty well disappeared. Since last report sellers have reported a moderate volume of enquiry in respect of forward contracts and a certain amount of new business has been booked with deliveries extending over the second half of the year. In the meantime there is a steady flow of specifications for deliveries against existing contracts, and in this connection it is satisfactory to learn that the slight improvement recently experienced in the movement of textile chemicals has been maintained. The undertone of the chemical market as a whole is steady. Among the by-products also conditions have been a little better from the point of view of new orders and values generally are on a firm basis.

GLASGOW.—There has been a slight improvement in the demand for chemicals for home trade during the week, though export inquiries have been rather limited. Prices generally continue very firm at about previous figures, the only change of importance being an increase of £1 per ton in the prices of red lead and white lead. A steady tone is maintained on the coal tar products market with prices firm and more or less unchanged. Apart from a seasonal improvement in deliveries of refined tars for road purposes, works activity in this district has been confined largely to existing contract commitments with supplies of cresylic acid still well looked after there is some indication of increased interest in high boiling phenols, and a tendency for this price to advance. So far no business is reported, however, for fair quantities beyond 2s. 8d. per gallon. Creosote remains steady and washed oil has changed hands round 5½d. per gallon f.o.r. tank wagons.

General Chemicals

ACETONE.—£45 to £47 per ton.

ACID, ACETIC.—Tech., 80%, £30 5s. to £32 5s. per ton; pure 80%, £30 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ACID, BORIC.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

ACID, CHROMIC.—9¼d. per lb., less 2½%; d/d U.K.

ACID, CITRIC.—1s. per lb. MANCHESTER: 1s. SCOTLAND: B.P. crystals, 1s. per lb., less 5%, ex store.

ACID, FORMIC.—85%, in carboys, ton lots, £42 to £47 per ton.

ACID, HYDROCHLORIC.—Spot, 5s. to 7s. 6d. carboy d/d according to purity, strength and locality.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50: pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works.

ACID, OXALIC.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.

ACID, SULPHURIC.—168° Tw., £4 5s. to £4 15s. per ton; 140° Tw., arsenic-free, £2 15s. to £3 5s.; 140° Tw., arsenious, £2 10s.

ACID, TARTARIC.—1s. 1¼d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1¼d. to 1s. 1½d. per lb.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 per ton d/d Lancs.; GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £16 10s. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—£55 10s. per ton.

ARSENIC.—LONDON: £13 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £17 ex store. MANCHESTER: White powdered Cornish, £17 10s., ex store.

BARIUM CHLORIDE.—£10 per ton. GLASGOW: £11 5s. per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot, 35/37%. £8 15s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums. GLASGOW: 70/75% solid, £5 10s. per ton net ex store.

CHROMETAN.—Crystals, 2½d. per lb.; liquor, £19 10s. per ton d/d

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. GLASGOW: 99%, £4 7s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£22 10s. per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £5 7s. 6d. to £6 7s. 6d. per cwt. according to quantity; in drums, £5 to £5 13s. 6d.

IODINE.—Resublimed B.P., 5s. 1d. per lb.

LEAD ACETATE.—LONDON: White, £35 10s. per ton; brown, £35. GLASGOW: White crystals, £34 to £35; brown, £1 per ton less. MANCHESTER: White, £36; brown, £35 10s.

LEAD NITRATE.—£39 per ton.

LEAD, RED.—SCOTLAND: £38 per ton, less 2½%, carriage paid for 2-ton lots.

LEAD (WHITE SUGAR OF).—GLASGOW: £37 per ton net, ex store.

LITHARGE.—SCOTLAND: Ground, £37 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 10s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 11d. per lb.; powder B.P., 6s. 1d.; bichloride B.P. (corros. sub.) 5s. 2d.; powder B.P. 4s. 10d.; chloride B.P. (calomel), 5s. 11d.; red oxide cryst. (red precip.), 7s.; levig. 6s. 6d.; yellow oxide B.P. 6s. 4d.; persulphate white B.P.C., 6s. 1d.; sulphide black (hyd. sulph. cum sulph. 50%), 6s. For quantities under 112 lb., 1d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

PARAFFIN WAX.—SCOTLAND: 3½d. per lb.

PHENOL.—7⅞d. to 8½d. per lb.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £39

POTASSIUM BICHROMATE.—SCOTLAND: 5d. per lb., less 5%, carriage paid.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4½d. per lb. MANCHESTER: £38 per ton.

POTASSIUM IODIDE.—B.P. 4s. 3d. per lb.

POTASSIUM NITRATE.—£27 per ton. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. Crystals, 9¾d. MANCHESTER: B.P. 11d. to 1s.

POTASSIUM PRUSSATE.—6½d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6½d. to 6¾d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels. GLASGOW: Large crystals, in casks, £38.

SALT CAKE.—Unground, spot, £3 16s. 6d. per ton.

SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £12 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£18 per ton carriage paid North. GLASGOW: £18 10s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. GLASGOW: £12 15s. per ton in 1 cwt. kegs, £11 per ton in 2-cwt. bags. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. MANCHESTER: 4d. per lb. GLASGOW: 4d., less 5% carriage paid.

SODIUM BISULPHITE POWDER.—60/62%. £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags.

SODIUM CHLORATE.—£26 10s. to £30 per ton. GLASGOW: £1 10s. per cwt.

SODIUM CHROMATE.—4d. per lb. d/d U.K.
SODIUM HYPOSULPHATE.—Commercial, 2 ton lots d/d, £10 5s. per ton; photographic, £14 5s. MANCHESTER: Commercial, £10; photographic, £14 10s.
SODIUM METASILICATE.—£14 per ton, d/d U.K. in cwt. bags.
SODIUM NITRATE.—Refined, £7 15s. per ton for 6-ton lots d/d.
SODIUM NITRITE.—£18 5s. per ton for ton lots.
SODIUM PERBORATE.—10%, 9¼d. per lb. d/d in 1-cwt. drums.
SODIUM PHOSPHATE.—£13 per ton.
SODIUM PRUSSIATE.—4d. per lb. for ton lots. GLASGOW: 5d. to 5¾d. ex store. MANCHESTER: 4d. to 4½d.
SODIUM SILICATE.—£9 10s. per ton.
SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.
SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 10s.
SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 5s. per ton d/d in drums; crystals 30/32%, £8 15s. per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.
SODIUM SULPHITE.—Pea crystals, spot, £13 5s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.
SULPHATE OF COPPER.—£20 per ton, less 2%, in casks. MANCHESTER: £22 10s. per ton f.o.b. SCOTLAND: £24 10s. per ton less 5%, Liverpool, in casks.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 1d. per lb., according to quality. Crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.
ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.
BARYTES.—£6 to £7 10s. per ton, according to quality.
CADMIUM SULPHIDE.—7s. 2d. to 7s. 5d. per lb.
CARBON BISULPHIDE.—£31 to £33 per ton, according to quantity, drums extra.
CARBON BLACK.—3 11/16d. to 4 13/16d. per lb., ex wharf.
CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.
CHROMIUM OXIDE.—Green, 1s. 2d. per lb.
DIPHENYLGUANIDINE.—2s. 2d. per lb.
INDIA-RUBBER SUBSTITUTES.—White, 4½d. to 5d. per lb.; dark, 3¾d. to 4½d. per lb.
LAMP BLACK.—£22 to £23 per ton d/d London; vegetable black, £28 to £48.
LEAD HYPOSULPHITE.—9d. per lb.
LITHOPONE.—30%, £16 10s. to £17 5s. per ton.
SULPHUR.—£9 to £9 5s. per ton. SULPHUR PRECIP. B.P., £55 to £60 per ton. SULPHUR PRECIP. COMM., £50 to £55 per ton.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.
VERMILION.—Pale, or deep, 5s. 3d. per lb., 1-cwt. lots.
ZINC SULPHIDE.—10d. to 11d. per lb., according to quality.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Neutral quality, basis 20.6 per cent. nitrogen, delivered in 6-ton lots to farmer's nearest station, £7 5s. per ton.
CALCIUM CYANAMIDE.—£7 5s. per ton, carriage paid to any railway station in Great Britain in lots of four tons and over.
NITRO-CHALK.—£7 5s. per ton for delivery to end of June.
NITRATE OF SODA.—£7 12s. 6d. per ton for delivery up to end of June.
CONCENTRATED COMPLETE FERTILISERS.—£10 12s. to £11 1s. per ton delivered in 6-ton lots to farmer's nearest station.
AMMONIUM PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton for delivery up to end of June, delivered in 6-ton lots to farmer's nearest station.

Coal Tar Products

ACID, CRESYLIC.—97/99%, 5s. 1d. to 5s. 2d. per gal.; 99/100%, 5s. to 5s. 9d., according to specification; pale 99%, 5s. 3d. to 5s. 6d.; dark, 4s. 6d. to 4s. 8d. GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. 4d. to 2s. 8d. American specification, 4s. 3d. to 4s. 6d. MANCHESTER: Pale, 99/100%, 5s.
ACID, CARBOLIC.—Crystals, 6¾d. to 8¼d. per lb.; crude, 60's, 4s. to 4s. 3d. per gal. MANCHESTER: Crystals, 8¼d. per lb. f.o.b. in drums; crude, 3s. 10d. per gal. GLASGOW: Crude, 60's, 3s. 9d. to 4s. per gal.; distilled, 60's, 4s. 3d. to 4s. 6d.
BENZOL.—At works, crude, 10d. to 10½d. per gal.; standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4½d. to 1s. 5d.; pure, 1s. 8½d. to 1s. 9d. GLASGOW: Crude, 10d. to 10½d. per gal.; motor, 1s. 5d. to 1s. 5½d.
CREOSOTE.—B.S.I. Specification standard, 6d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4½d. f.o.r. North: 5d. London. MANCHESTER: 5½d. to 6½d. GLASGOW: B.S.I. Specification, 6d. to 6¼d. per gal.; washed oil, 5¼d. to 5¾d.; lower sq. gr. oils, 5¼d. to 5¾d.
NAPHTHA.—Solvent, 90/160%, 1s. 7d. to 1s. 8d. per gal.; 95/160%, 1s. 8d. to 1s. 9d.; 90/190%, 1s. 2d. to 1s. 3d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. GLASGOW: Crude, 6d. to 6¾d. per gal.; 90% 160, 1s. 6½d. to 1s. 7½d., 90% 190, 1s. 1d. to 1s. 2d.
NAPHTHALENE.—Crude, whizzed or hot pressed, £11 to £12 per ton; purified crystals, £18 to £20 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 to £5 10s. per ton; crystals, £27 to £27 10s. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free). MANCHESTER: Refined, £21 per ton f.o.b.
PYRIDINE.—90/140%, 9s. to 9s. 6d. per gal.; 90/180, 2s. 9d. to 3s. 6d. GLASGOW: 90% 140, 9s. to 10s. per gal.; 90% 160, 7s. to 8s.; 90% 180, 2s. 6d.
TOLUOLE.—90%, 2s. 1d. per gal.; pure, 2s. 6d. to 2s. 7d. GLASGOW: 90%, 120, 1s. 10d. to 1s. 11d. per gal.
PITCH.—Medium, soft, 36s. to 37s. per ton, in bulk at makers' works. MANCHESTER: 35s. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 32s. to 37s. per ton; in bulk for home trade, 32s. 6d.
XYLOL.—Commercial, 2s. 3d. per gal.; pure, 2s. 5d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. to £9 per ton; grey, £10 10s. to £11 10s. Liquor, brown, 30° Tw., 6d. to 8d. per gal. MANCHESTER: Brown, £9 10s.; grey, £11 10s.
CHARCOAL.—£5 15s. to £11 per ton, according to grade and locality.
METHYL ACETONE.—40-50%, £42 to £45 per ton.
WOOD CREOSOTE.—Unrefined 6d. to 1s. 6d. per gal., according to boiling range.
WOOD, NAPHTHA, MISCIBLE.—2s. 9d. to 3s. 3d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.
WOOD TAR.—£2 10s. to £4 per ton.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex toluol).—1s. 9½d. per lb. d/d buyer's works.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID NAPHTHIONIC.—1s. 8d. per lb.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100%, d/d buyer's works
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZIDINE, HCl.—2s. 5d. per lb., 100% as base, in casks.
m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.
o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.
p-CRESOL 34-5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.
DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—7½d. per lb.
DINITROCHLORBENZENE, SOLID —£72 per ton.
DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C., 10d.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works
β-NAPHTHOL.—9½d. to 9⅝d. per lb.; flake, 9½d. to 9⅝d.
α-NAPHTHYLAMINE.—Lumps, 1s. per lb.; ground, 1s. 0½d. in casks.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works in casks.
o-NITRANILINE.—3s. 11d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb., d/d buyer's works
p-NITRANILINE.—Spot, 1s. 8d. to 2s. 1d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.
NITRONAPHTHALENE.—9d. per lb.; P.G., 1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb., 100% d/d buyer's works.
o-TOLUIDINE.—10½d. per lb., in 8/10-cwt. drums, drums extra.
p-TOLUIDINE.—1s. 10½d. per lb., in casks.
m-XYLIDINE ACETATE.—4s. 3d. per lb., 100%.

Latest Oil Prices

LONDON, June 2.—LINSEED OIL was firm. Spot, £32 per ton (small quantities); June to Jan.-April, £29 12s. 6d., naked. SOYA BEAN OIL was steady. Oriental (bulk), afloat, Rotterdam, £24 10s. per ton, sellers. RAPE OIL was inactive. Crude, extracted, £36 per ton; technical refined, £37, naked, ex wharf. COTTON OIL was dull. Egyptian crude, £28 10s. per ton; refined common edible, £32 5s.; deodorised, £34 5s., naked, ex mill (small lots £1 10s. extra). TURPENTINE was lower. American spot, 37s. 6d. per cwt.

HULL.—LINSEED OIL.—Spot, quoted £30 per ton; June-Aug. and Sept.-Dec., £29 10s. COTTON OIL.—Egyptian, crude, spot, £28 10s. per ton; edible, refined, spot, £31 10s.; technical, spot, £31 10s.; deodorised, £33 10s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £26 per ton, naked. GROUND NUT OIL, extracted, spot, £32 per ton; deodorised, £35. RAPE OIL, extracted, spot, £35 per ton; refined, £36. SOYA OIL, extracted, spot, £31 per ton; deodorised, £34. COD OIL, f.o.r. or f.a.s., 27s. 6d. per cwt., in barrels. CASTOR OIL, pharmaceutical, 44s. per ton; first, 39s.; second, 37s. TURPENTINE, American, spot, 39s. 6d. per cwt.

From Week to Week

THE WASHINGTON CHEMICAL CO., Co. Durham, is contemplating extensions to its works which will cost £25,000.

DURING CASTING OPERATIONS at the Tees Ironworks of Pease and Partners, Ltd., Middlesbrough, on May 27, an explosion occurred which resulted in injuries to four men.

GIBBON BROTHERS, Dudley, have been awarded a contract for the erection of ovens at Seaham Harbour for Coal and Allied Industries, Ltd., for the making of smokeless fuel. The works were recently taken over by Mr. H. Lane, of Norton, Stockton-on-Tees.

PEASE AND PARTNERS, LTD., are making arrangements to reopen their Woolley colliery at Crook, County Durham, at an early date. This has been made possible through the completion of negotiations with Dorman, Long and Co., who will take the whole of the output for coking purposes for some considerable time. The colliery was closed in 1931.

OWING TO THE GRADUAL WORKING OUT of the limestone, Charlestown Lime Co., Ltd., has found it necessary to terminate its lease of the works at Charlestown, Fife. The company has secured a lease of Roscobie Lime Works, Dunfermline. The lime is of high quality, and it is intended to install up-to-date machinery for the production of all kinds of lime and limestone. Production will begin at an early date.

WILLIAM DORNAN lost his life on May 28 in an explosion which blew him from the roof of an oil tank at the refineries of Scottish Oils, Ltd., at Pumpherston, West Lothian. He had gone to measure the hot oil and was standing on a platform 30 ft. from the ground when the explosion occurred. He died shortly after admission to Edinburgh Royal Infirmary. Other explosions followed, and it is estimated that 22,000 gal. of oil were destroyed.

NUODEX PRODUCTS OF CANADA, LTD., with offices at 132 St. Helen's Avenue, Toronto, has recently been incorporated under Ontario charter. A factory is being erected at Leaside, with 8,000 ft. of floor space. This company, a subsidiary of Nuodex Products Co., Inc., of Elizabeth, New Jersey, will manufacture metallic driers for the paint, varnish, ink, floor covering and allied industries for the Canadian market, and will export to all parts of the British Empire, enabling the trade in the Commonwealth to obtain Empire-made Nuodex at a substantial saving in price.

THE DIRECTORS of British Industrial Plastics, Ltd. (formerly the British Cyanides Co., Ltd.), state in an interim report that during the six months ended March 31 sales of Beetle moulding powders showed no abnormal feature, the demand being steady and well spread over the whole period. Since Easter the demand has risen rapidly and sales are now larger than ever before. The consumption of Scarab moulding powders during the six months rose more rapidly than was anticipated, with the result that the total profits of the group for the first six months show an increase over the corresponding period of the previous year. During the greater part of the six months the plant for manufacturing prussiates has been closed down and modernised.

IMPERIAL CHEMICAL INDUSTRIES, LTD., has offered to purchase the whole of the Magadi Soda Co.'s outstanding 6 per cent. mortgage debentures at the rate of £75 per cent. cash, including all arrears of interest accrued and accruing and free of all costs and expenses except stamp duties and transfer fees. Should the whole of the debentures outstanding not be made available for purchase by Imperial Chemical Industries that company reserves the right either to withdraw from the whole transaction or to accept such debentures as have been deposited at June 21. Holders are, therefore, requested to send to the Union Bank of Scotland, Ltd., 62 Cornhill, E.C.3, the form of offer for sale, duly completed, and blank transfer signed by them and duly witnessed, together with their debentures, so as to reach that address not later than June 21. There are £425,700 of these debentures outstanding, the market price being 70 to 80.

THE SIXTEENTH EXPOSITION OF CHEMICAL INDUSTRIES will be held at Grand Central Palace, New York, from December 6 to 11. The advance leasing of exhibit space indicates that the 1937 exposition will be one of the most representative and comprehensive in recent years. Dr. M. C. Whitaker, vice-president of the American Cyanamid Co., will be chairman of the advisory committee. Principal sections will include chemicals and chemical products, metals and alloys, laboratory equipment and supplies, instruments of precision, containers and packaging, materials handling equipment, brewing, distilling and bottling equipment, industrial chemical equipment and machinery. A number of exhibits will feature the modern synthetic plastics and moulded products, also lacquers, varnishes and corrosion resisting surface coatings of wide variety. Exhibits designed to explain natural resources and industrial opportunities for plant location, and a variety of educational exhibits will complete the display.

A SHOWER-BATH for employees was opened at Brown Bayley's Steel Works, Ltd., Sheffield, on Tuesday. It is claimed that this is the first shower-bath to be installed in an English steel works.

IMPERIAL CHEMICAL INDUSTRIES, LTD., has undertaken to consider a claim for higher wages made by members of the Amalgamated Engineering Union in their employment. The undertaking was the outcome of a meeting between representatives of the company and the Executive Council of the A.E.U. at which the claim was made and the question of non-unionism within the works was discussed.

THE CONTINUED DISCOVERY OF NEW DEPOSITS in the tungsten fields of Tchontanda, in the Wankie area of Rhodesia, is regarded by experts as pointing to developments which may eventually revolutionise Rhodesian industry. The initial strike was made a couple of years ago; the first plant, to deal with 150 tons daily, will shortly be in commission after considerable difficulty in this forbidding region of desolate country. A twenty-mile power line will be run from Wankie, a small township in the desert.

GERMANY is importing "mud" from the United States, which is calculated to be worth £14 a ton to two German scientists, who want it for its valuable metal content, which they hope to extract by a cheap secret process. The first of several shipments has passed through the New York State barge canal here on its way to Europe. Contracts call for the movement of 40,000 tons across the Atlantic. Two German scientists visited the United States several years ago and took three suitcases full of the stuff back with them. They worked out a process to reclaim silver, tin and platinum.

FOR THE SECOND TIME IN ITS HISTORY the Society of Glass Technology has met in Scotland. On May 27 the members gathered in Edinburgh, and on the following day they visited Glasgow to hold their formal meetings and to hear papers of a scientific and technical nature. Professor W. E. S. Turner, of Sheffield University, the president of the society, occupied the chair, and at the outset spoke of the position of the glass industry in Scotland. Since the last visit of the society to Scotland in 1920, he said, works in Scotland had been engaging technical men as members of their staffs, and the general outlook had very greatly improved. Scotland had quite a fair representation in the British glass industry, and made a very substantial contribution to the industry.

LORD MCGOWAN, chairman of Imperial Chemical Industries, Ltd., visited Widnes on Monday to present long service awards to 145 employees of the works in the general chemical group of the Mersey area. Mr. Holbrook Gaskell, a director, who was among the recipients with 35 years' service, received a gold watch. Since the inception of the service awards in 1928, 100 have received recognition with fifty years' service, 505 with forty years, 858 with thirty-five years, and 1,242 with twenty-five years. Lord McGowan said it was his first visit to Widnes in his capacity as chairman, and the first since his elevation to the peerage. He attributed his success to the loyalty and devotion of the management and employees of the various factories constituting I.C.I. He spoke of the general development that had taken place in Widnes and of the efficiency which had contributed in no small measure to the progress made by the company. Mr. Holbrook Gaskell said it was ninety years since the late Mr. John Hutchinson visualised the possibilities of Widnes as a chemical centre. He reviewed the early struggles of the chemical manufacturers and the intensive competition they had to face in later years.

New Companies Registered

Southwark Glass Co., Ltd., 26 Marshalsea Road, Southwark, S.E.1.—Registered May 11. Nominal capital £3,000 in £1 shares. To acquire the businesses of a glass merchant and druggists' sundriesman carried on by Frank T. Maish as "The Southwark Glass Co.," and "James Sinclair & Son." Directors:—Frank T. Maish, James L. Egan, and John S. Hake.

Grangersol, Ltd.—Registered May 19. Nominal capital, £100. To acquire any interests in patents relating to the treating and rendering proof against gas, moisture, water, grease and mildew of building materials, fabrics, textiles, paper and other substances, and to carry on the business of chemists, druggists, etc. Subscribers: Phineas S. Solomon, 5 Bedford Row, W.C.1; and Wm. C. Paske.

Midland Cosmetic Laboratories, Ltd., "Gleem House," 14-6 Northampton Street, Leicester.—Registered May 19. Nominal capital, £1,000. Cosmetic manufacturers, cosmetic oil blenders, wholesale manufacturing floral and chemical perfumers, importers and distributors of essential oils, perfumes, crude and volatile fats and oils, manufacturers of and dealers in appliance bottle caps and accessories, etc. Directors: Leslie L. S. Millett, Robert Goldsmith, and Thos. G. Evans.

Chemical and Allied Stocks and Shares

THE stock and share markets became active on the abandonment of the N.D.C. tax. Imperial Chemical are 36s. 4½d. at the time of writing, compared with 37s. 7½d. a week ago. The lower price is attributed entirely to general market conditions as there are confident anticipations that the dividend is likely to be at least maintained at 8 per cent. for the current year, and the yield offered is favourable. Salt Union moved in sympathy and are 53s. 1½d. It is expected in the market that the I.C.I. offer to Salt Union shareholders will be accepted. B. Laporte are lower, the list price now being 4⅞-5⅛, but the shares are held firmly and very few sellers were reported. British Oxygen were active and inclined to improve later, the statements at the recent meeting having increased the belief that the business has scope for further considerable expansion. Turner and Newall at 95s. were lower despite continued anticipations in the market of a larger interim dividend. Distillers were also influenced considerably by general market conditions, having declined on the week from 115s. 6d. to 112s. 6d.

Unilever at 42s. 3d. have more than held last week's rise and Lever Brothers preference issues were very steady, while British Oil and Cake Mills preferred ordinary were better at 48s. General Refractories at 29s. 3d. have lost 9d. on the week. Borax Consolidated deferred were retained at 30s. British Glues were held tightly on anticipations of larger dividend and have kept at 8s. 6d. British Drug Houses were steady at around 22s., and British Industrial Plastics were somewhat lower at 2s. 9d. to which the price went following publication of the recently-issued progress report. Cooper, McDougall and Robertson were higher at around 36s. 6d., and Fison, Packard and Prentice changed hands around 38s. 9d. United Molasses have reacted from 31s. to 29s. 6d. Boots Pure Drug at 51s. have not held best prices despite the excellent impression created by the exceptionally strong balance sheet position which would seem to justify market anticipations that a bonus of some kind appears likely sooner or later. Timothy Whites and Taylors and Sangers were both maintained at the same prices as a week ago.

Triplex Safety Glass attracted more attention on the increasing belief that the company's profits are continuing to rise and that an excellent dividend seems possible on the larger capital arising from the bonus distributions made earlier in the year. Forster's Glass were held very tightly on the bonus announcement and United Glass Bottle were steady at 52s. 6d. Canning Town Glass 5s. shares were again 6s.,at which they offer a favourable yield, last year's dividend having been 7 per cent.

Associated Portland Cement, British Plaster Board and various other cement and allied shares were steadier later, on the growing belief that activity in the building and kindred trades is apparently being maintained. Wall Paper deferred made the rather better price of 40s. 7½d., it being pointed out that an unduly generous yield sems to be given, having regard to the fact that the 12½ per cent. dividend paid last year was covered by a good margin and that there would apparently have to be a sharp decline in profits to necessitate a "cut" in the current year's dividend. Pinchin Johnson were steady.

Stanton Ironworks were lower in the absence of confirmation of market hopes of a larger dividend, but the full results will probably show that a conservative policy is being followed. Staveley Coal and Iron, Dorman Long, Richard Thomas and Whitehead Iron and Steel were better later, the last-named on the bonus proposals.

Leading oil shares responded to the dividend and bonus of Anglo-Iranian Oil, which were in excess of best market estimates. Trinidad Leaseholds were also better, aided by anticipations that the total dividend may be brought up to over 30 per cent.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Open to Public Inspection

FUMIGATION.—Guardite Corporation and Carbide and Carbon Chemicals Corporation. Nov. 18, 1935. 24057/36.

PROCESS FOR THE RECOVERY OF COPPER from waste liquors of the artificial silk industry.—I. G. Farbenindustrie. Nov. 23, 1935. 25218/36.

PROCESSES OF RECOVERING SULPHURIC ACID or sulphuric-acid solutions of sulphates.—O. Mantius, and E. Mantius. Nov. 23, 1935. **25553/36.**

PROCESS FOR MAKING CUPRIFEROUS ZEOLITE FUNGICIDES.—Permutit Co. Nov. 19, 1935. 29786/36.

PRODUCTION OF ORGANIC PHOSPHOROUS COMPOUNDS.—Celluloid Corporation. Nov. 20, 1935. 29897/36.

PROCESS FOR THE PRODUCTION OF AMMONIUM NITRATE and mixtures containing the same and apparatus therefor.—Directie Van de Staatsmijnen in Limburg. Nov. 18, 1935. 30334/36.

PROCESS FOR THE MANUFACTURE OF CALCIUM HYDRIDE.—Ventures, Ltd. Nov. 19, 1935. 30818/36.

MANUFACTURE AND PRODUCTION OF TANNING AGENTS.—I. G. Farbenindustrie. Nov. 23, 1935. 31444/36.

ELECTROLYTIC PRODUCTION OF SODIUM and other light metals.—E. I. du Pont de Nemours and Co. Nov. 20, 1935. 31872/36.

PROCESS FOR THE MANUFACTURE OF TERTIARY ALCOHOLS of the cyclopentano polyhydro phenananthrene series.—Schering-Kahlbaum A.-G. Nov. 22, 1935. 32065/36.

PROCESS FOR OBTAINING ALCOHOL and/or yeast by fermentation of liquids containing carbohydrate.—Naamlooze Vennootschap Internationale Suiker en Alcohol Compagnie International Sugar and Alcohol Co. Isaco. Nov. 22, 1935. 32080/36.

DEWAXING MINERAL OIL.—Texaco Development Corporation. Nov. 18, 1935. 14065/37.

Specifications Accepted with Date of Application

MANUFACTURE OF VINYL RESINS.—H. E. Potts (Shawinigan Chemicals, Ltd.). Aug. 12, 1935. 465,823.

MANUFACTURE OF PHOTOGRAPHIC SILVER HALIDE EMULSIONS.—W. W. Groves (I. G. Farbenindustrie). Aug. 12, 1935. 465,823.

MANUFACTURE OF DYES.—Kodak, Ltd. (Eastman Kodak Co.). Aug. 15, 1935. 466,097.

MANUFACTURE AND PRODUCTION OF IMPROVED ARTIFICIAL TEXTILE MATERIALS.—G. W. Johnson (I. G. Farbenindustrie). Sept. 16, 1935. 466,098.

DYEING OF CELLULOSIC FIBROUS MATERIALS.—W. W. Groves (I. G. Farbenindustrie). Sept. 18, 1935. 466,099.

PROCESS OF PREPARING PURIFIED GLYCYRRHIZINE (pale glycyrrhizine).—Etablissements Sareb Soc. Anon. Nov. 10, 1934. 465,949.

MANUFACTURE OF PLASTIC MATERIALS derived from organic polysulphides.—Thiokol Corporation. June 27, 1935. 466,159.

MANUFACTURE OF BENZENE DERIVATIVES containing halogenated methyl-groups.—W. W. Groves (I. G. Farbenindustrie). Nov. 15, 1935. 465,885.

THERAPEUTICALLY-ACTIVE SUBSTANCE.—A. Coulthard and Imperial Chemical Industries, Ltd. Nov. 15, 1935. 465,886.

MANUFACTURE OF ACID WOOL DYESTUFFS of the anthraquinone series.—I. G. Farbenindustrie. Nov. 16, 1934. 465,889.

PROCESSES FOR THE REMOVAL FROM SURFACES of adherent deposits formed by oil.—E. A. Evans and C. C. Wakefield and Co., Ltd. Nov. 16, 1935. 466,166.

PROCESS FOR THE MANUFACTURE OF RED AZO DYESTUFFS.—Chemical Works, formerly Sandoz. Nov. 21, 1934. 465,955.

BLEACHING BY HYDROGEN PEROXIDE.—E. I. du Pont de Nemours and Co., J. S. Reichert and R. B. Elliott. Nov. 18, 1935. 466,112

MONOAZO DYESTUFFS.—A. H. Knight and Imperial Chemical Industries, Ltd. Nov. 18, 1935. 465,957.

MANUFACTURE OF KETONES of polycyclic hydroaromatic compounds.—W. W. Groves (I. G. Farbenindustrie). Nov. 18, 1935. 465,960.

MANUFACTURE AND PRODUCTION OF RESINOUS CONDENSATION PRODUCTS.—G. W. Johnson (I. G. Farbenindustrie). Nov. 19, 1935. 466,170.

MANUFACTURE OF BENZALDEHYDES containing trifluoromethyl-groups.—W. W. Groves (I. G. Farbenindustrie). Nov. 20, 1935. 466,007.

MANUFACTURE OF AZO DYESTUFFS containing chromium.—A. G. Bloxam (Soc. of Chemical Industry in Basle). Nov. 20, 1935. 466,189.

MANUFACTURE OF POLYMERIZATION PRODUCTS.—I. G. Farbenindustrie. Nov. 20, 1934. 466,173.

PREPARATION OF RUBBER MIXTURES STABLE TO LIGHT.—G. W. Johnson (I. G. Farbenindustrie). Nov. 20, 1935. 466,174.

MANUFACTURE AND PRODUCTION OF DYESTUFFS.—G. W. Johnson (I. G. Farbenindustrie). Nov. 20, 1935. 466,194.

MANUFACTURE OF MONOAZO DYESTUFFS.—A. H. Knight, F. Lodge and Imperial Chemical Industries, Ltd. Nov. 21, 1935. 466,127.

MANUFACTURE OF ALKYL CHLORIDES.—E. I. du Pont de Nemours and Co. Nov. 22, 1934. 466,134.

ORGANIC MERCURY COMPOUNDS and their manufacture.—E. I. du Pont de Nemours and Co. Nov. 23, 1934. 466,183.

PROCESS FOR THE MANUFACTURE OF HIGHLY DISPERSED PIGMENTS. I. G. Farbenindustrie. Nov. 24, 1934. 466,042.

PROCESS FOR THE MANUFACTURE OF LEATHER.—A. Carpmael (I. G. Farbenindustrie). Nov. 22, 1935. 466,135.

MANUFACTURE AND PRODUCTION OF VAT DYESTUFFS.—G. W. Johnson (I. G. Farbenindustrie). Nov. 28, 1935. 466,184.

MANUFACTURE OF SUBSTITUTED PYRIDINE-ORTHO-DICARBOXYLIC ACID AMIDES.—Soc. of Chemical Industry in Basle. Dec. 5, 1934. 466,185.

MANUFACTURE OF AZO DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie). Dec. 27, 1935. 465,902.

PROCESS OF PRODUCING PIGMENTAL COLOURING MATTER.—Dr. W. Muhlberg. Feb. 19, 1935. 465,912.

PREPARATION OF COMPOUNDS OF THERAPEUTIC VALUE.—L. S. E. Ellis (Soc. des Usines Chimiques Rhone-Poulenc). Feb. 18, 1936. 465,914.

PRODUCTION OF MALEIC ACID.—Carbide and Carbon Chemicals Corporation. April 9, 1935. 465,848.

METHOD OF PREPARING (1-PHENYL-2, 3-DIMETHYL-5-PYRAZOLONYL)-ISOPENTYL KETONE.—H. P. Kaufmann. May 7, 1935. 465,982.

POLYMERIZATION OF OLEFINES.—Standard Oil Development Co. Oct. 26, 1935. 466,066.

SEPARATION OF SULPHURETTED HYDROGEN FROM GASES.—Dr. H. Kemmer and M. Raschig. May 15, 1936. 466,067.

METHOD OF AN- APPARATUS FOR THE INDUSTRIAL PRODUCTION of pure crystalline natural grape-sugar (glucose, dextrose), from grapes or raisins.—J. G. Marakas. June 22, 1935. 465,852.

PROCESS FOR THE MANUFACTURE of di- and tri-iodo derivatives of acylamino acids and their salts.—W. P. Williams (Schering-Kahlbaum A.-G.). Aug. 29, 1936. 465,994.

ARTICLES THAT ARE SUBJECTED TO AND MUST RESIST ATTACK by solutions containing free chlorine or hypochlorous acid, its salts, and solutions therefor—Stahlwerke Rochling-Buderus A.-G. Sept. 16, 1935. 465,999.

MANUFACTURE OF LACQUERS.—A. G. Bloxam (Soc. of Chemical Industry in Basle). Oct. 8, 1935. 466,096.

Applications for Patents

MANUFACTURE OF RUBBER CHLORIDE VARNISHES.—Raolin Corporation. (Feb. 5.) (United State, Feb. 5, '36.) 13915.

CREASE-RESISTANT TREATMENT OF TEXTILE FABRICS.—A. E. Roberts. 13922.

PRODUCTION OF POLYMERISATION PRODUCTS.—Röhm and Haas, A.-G. (Dec. 6, '35.) (Germany, Dec. 6, '34.) 13675.

MANUFACTURE OF ETHERS, ETC. FROM OLEFINES.—Standard Alcohol Co. (United States, June 9, '36.) 13945.

MANUFACTURE OF RESIN FROM LAC, ETC.—A. F. Suter and Co., Ltd. 13981.

TREATING METAL BODIES.—A. A. Thornton (Bercovitz and Debor.) 13813.

ROUGES AND COSMETICS.—F. J. Vicki. (France, May 16, '36.) 13842.

COLOURATION OF TEXTILE MATERIALS.—J. A. Wainwright, and S. Allan. 13544.

PRODUCING SHRINK-PROOF SHEET AND CELLULAR FIBRE rendered repellant to water.—American Reenforced Paper Co. (United States, May 20, '36.) 14066.

MANUFACTURE OF OILS, ETC., FROM CELLULOSE ESTERS.—H. A. Auden. 14194.

DESULPHURIZATION, ETC., OF IRON.—H. A. Brassert and Co., Ltd. (Andrews). 14653.

CAST-IRON.—British Cast Iron Research Association, E. Morgan and A. L. Norbury. 14583.

MANUFACTURE OF AZO DYESTUFFS and preparations for the production thereof.—A. Carpmael (I. G. Farbenindustrie). 14215.

MANUFACTURE OF PHOSPHORIC ACID COMPOUNDS.—A. Carpmael (I. G. Farbenindustrie). 14216.

MANUFACTURE OF CARBOCYCLIC AND HETEROCYCLIC AMINES.—A. Carpmael (I. G. Farbenindustrie). 14217.

MANUFACTURE OF CAPILLARY ACTIVE SUBSTANCES.—A. Carpmael (I. G. Farbenindustrie). 14083.

PROCESS FOR PURIFICATION OF THE YELLOW OXIDATION FERMENT.—A. Carpmael (I. G. Farbenindustrie). 14084.

MANUFACTURE OF DYESTUFFS of the anthraquinone series.—A. Carpmael (I. G. Farbenindustrie). 14085.

PROCESS FOR ENRICHING BIOTIN.—A. Carpmael (I. G. Farbenindustrie). 14393.

MANUFACTURE OF LACQUERS, ETC.—Deutsche Hydrierwerke. (Germany, May 23, '36.) 14405.

PROCESS OF MANUFACTURING PHENOL-ALDEHYDE RESINS or products thereof.—Dorch, Bäcksin and Cos. Aktiebolag. (Sweden Mary 26, '36.) 14290.

PROCESS OF TREATING PHENOL CONDENSATION PRODUCTS adapted for the manufacture of phenol-aldehyde resins or products thereof.—Dorch, Bäcksin and Cos. Aktiebolag. (Sweden, May 26, '36.) 14291.

MANUFACTURE OF ALKALI METAL DERIVATIVES of organic compounds.—E. I. du Pont de Nemours and Co., V. L. Hansley, N. O. Scott and S. E. Waller. 14108.

MANUFACTURE OF ALKALI METAL DERIVATIVES of acetylene hydrocarbons.—E. I. du Pont de Nemours and Co., N. O. Scott and S. E. Walker. 14109.

Forthcoming Events

LONDON.

June 10.—Chemical Society. Visit to Rothamsted Experimental Station, Harpenden, Herts.

June 11.—Physical Society. Ordinary meeting. , 5 p.m. Imperial College of Science and Technology, South Kensington.

Company News

A. Boake Roberts and Co.—A final dividend of 2 per cent., tax free, on ordinary shares has been announced.

National Fertilizers.—Dividend on 4½ per cent. redeemable cumulative preference shares for the period December 17, 1936, to June 30, 1937, inclusive, payable on July 1, less tax at 5s. in the £, has been announced.

Books Received

Kelly's Directory of Merchants, Manufacturers and Shippers of the World, 1937. 2 Vols. Kelly's Directories, Ltd. 64s.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Canada.—A well-established Vancouver firm of decorators and designers are about to establish a selling agency for goods connected with their present business and wish to secure United Kingdom agencies for paints, varnishes, enamels, stains, lacquers, prepared varnish gums, on a commission, consignment or purchasing basis, for the Province of British Columbia. (Ref. No. 201.)

Uruguay.—H.M. Consul at Montevideo reports that the State Electricity Supply and Telephones Administration, Montevideo, is calling for tenders, to be presented in that city by July 26, 1937, for the supply of quantities of lubricating oils for steam turbines, Diesel engines and compressors, and insulating oils for transformers and circuit-breakers. (Ref. TY/212.)

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ISAAC SPENCER AND CO. (GRIMSBY, 1936), LTD., oil manufactures, (M., 5/6/37.) May 19, £5,000 debenture, to Branch Nominees, Ltd.; general charge.

JAMES A. KEMP AND CO., LTD., Wallasey, varnish manufacturers. (M., 5/6/37.) May 14, mortgage, to Martins Bank Ltd. securing all moneys due or to become due to the Bank; charged on factory at Alfred Road and Birkenhead Road, Seacombe, etc.

County Court Judgments

(NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court Judgments against him.)

EVANS, WALTER, 1 Beaconsfield Avenue, Parkfield Road, Wolverhampton, soap manufacturer. (C.C., 5/6/37.) £47 5s. 10d. April 12.

BALLANTYNE, PETER, 206 West Auckland Road, Darlington, chemical worker. (C.C., 5/6/37.) £35 0s. 2d. May 5.